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(54) A mailboxing system for feeding sheets from an output device into selected mailbox bins.

(57) A dynamic "mailboxing" unit (10) and system for separating by users the sheet outputs of various users of a shared users printer (including facsimile receivers, copiers or combination units). It provides for stacking the sheets sequentially outputted from the printer in separate job sets into one or more temporarily and variably assigned "mailboxes" (11) of a "mailboxing" job sorting accessory unit (10) having a number of variably assignable "mailbox" (11) bins. It may also provide a bypass for sequentially stacking unstapled user sheets directly in a mailbox without compiling and stapling. A variable display (104) indicates the bins (11) into which that particular user's jobs have been placed last and not yet removed. Also disclosed is automatic overflow assignments of additional temporarily designated bins for identified users, as needed, to provide effectively unlimited or "virtual bin" plural job stacking. An integral moving sheet deflector, compiler and stapler unit (90) is shown for collecting, compiling, and optionally stapling, and ejecting job sets of sheets for separate designated users into one or more of these discrete but variably assigned "mailboxes". The "mailboxing" unit (10) may also have "privacy doors" locking for restricting access to at least some of the mailbox bins, with electrical door unlocking of selected bins in response to entry of a user access code, and other user features.

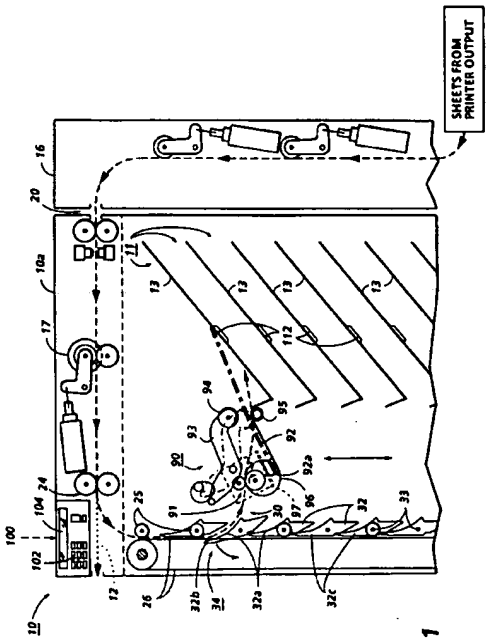

FIG. 1

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The present invention relates to a mailboxing system for feeding sheets from an output device, for example a printer, into selected mailbox bins. More particularly, the system feeds sheets into selected bins associated with respective users of the output device.

Mailbox sorter systems are known for feeding sheets from a printer into mailbox bins. Such systems are lacking however in the flexibility of their bin assignment methods when the printer has shared users. More particularly, the sheets or job sets associated with two or more users of the printer can often become commingled in the same mailbox bin. There is therefore a need for a mailboxing system allowing a plurality of users to share a printer or the like receiver, without disclosing, compromising or commingling their separate jobs and/or correspondence.

The present invention strives to meet the above need. Accordingly, the present invention provides a mailboxing system in accordance with any one of the appended claims.

Disclosed is a "mailbox" system for automatically discretely handling and segregating received copier, facsimile or other printer outputs, which can be used as a simple accessory for various existing such printers. In particular, there is disclosed an output sheet sorting system capable of independently handling and separating different jobs for different users or addressees automatically and simply.

The disclosed "mailboxing" unit embodiment can desirably be a universal modular or stand-alone unit that may be attached to, or even simply moved next to, the output of almost any conventional printer, including facsimile machines or networked electronic mail printers.

Disclosed is a universal (flexible) job sorting or "mailboxing" sheet output system for a printer, copier or facsimile output (encompassed by the term "printer" herein), in which sets or jobs of plural physical sheets outputted by a printer are directed into a particular "mailbox" bin, or set of bins, and the "mailbox" bins of the particular customer or user are indicated for job retrieval. This allows plural users of a printer to have a shared system which automatically puts different users outputs into different "mailboxes" or sorter bins. It can also automatically discretely notify the users of which bins their jobs are in. The disclosed system is "universal" in the sense that the mailbox sorter unit or module is flexible as to where the outputted sheets it receives come from, and can be used with many different printers. Also disclosed in an example herein is an integral job set compiling and finishing (stapling) system.

The disclosed system of the embodiment herein provides "mailbox" units for the output of a system printer with various potential desirable functions, in particular, automatically directing [and optionally finishing] print jobs from shared user printers to then-available bins of the "mailbox" unit, which bins will then be variably designated for identification and ultimate display to the users whose jobs have been stacked therein, so that the user will be told which bins of the mailbox unit their job outputs are in. i.e., the mailbox unit and/or the system can then display that job bin location information, preferably restricted to the particular user.

As further discussed hereinbelow, it will be appreciated that in a modern system or networked office environment, various of the control and software functions described herein may be done in the system print server rather than in the mailbox unit or the printer unit *per se*.

As disclosed in the embodiment herein, another disclosed optional feature can be to provide convenient discrete locked bins security for received hard copies for several different job recipients of shared user printers. That is, also disclosed in the example hereinbelow is electronically controlled bin unlocking for private bins security. These are more accurately described herein as "privacy doors" for certain designated bins. This allows plural recipients to share the same printer or the like receiver, without disclosing, compromising or commingling their separate jobs and/or correspondence. In other words, the disclosed embodiment provides a stand-alone "mailbox" or addressable sorter which can automatically sort and file various conventional output documents (conventional "hard copies", i.e., physical sheets) in discrete designated bins, which can optionally be secured. Yet, as further disclosed, these locked bins can be easily individually unlocked electrically to provide almost instant access to the secured hard copies. With the disclosed system, users or recipients do not need to stand by printers awaiting outputs to avoid their being read, or even accidentally taken, by other users, or commingled together into one stacking tray.

The term "mailboxing" as used herein refers to handling or sorting physical, i.e., "hard copy" printed sheets. It does not refer to electronic documents or images, which are much easier to manipulate.

To express it in another way, a "mailbox" in the example herein takes multiple print jobs from a printer (from user terminals, fax, networked purge images, scanned document jobs, or the like or combinations thereof) and separates jobs by users and stacks these hardcopy outputted print jobs into individual bins for individual users, by users. [As an additional software option, users may also send print jobs to other users' mailbox bins if desired.] Mailbox bins can, in general, be either user assignable, or automatically assigned by the printer, print server, or mailbox unit. Optionally, jobs can be individually stapled if a stapler unit is provided. Optional security doors can be added to any or all bins if desired. An overflow bin or general, shared, stacking tray may also desirably be provided, not assigned to any one user.

"Mailboxing" may more specifically, as in the example herein, refer to temporarily or permanently assigning a unique and predetermined electronic address to respective ones of plural bins of sorter-like equipment for a copier, printer or facsimile machine output, and enabling a particular user's output of one or more jobs to be directed into one or more selected bins so assigned. It may or may not include means for locking the bins and unlocking access thereto, as indicated above and as in the example herein. It may or may not additionally include a bin assignment scheme wherein each bin has an associated LCD or other type of display with the appropriate user name or label displayed, and/or a common or central display, as in the example herein, and/or wherein jobs are placed in more than one available bin if needed, i.e, if the sheet stacking capacity of one assigned bin is exceeded. As noted, a mailbox for a laser or other electronic page input printer may desirably print and feed *plural* precollated sets of sheets into a selected bin, rather than functioning as a normal collator or sorter, [although it may do so additionally or alternatively] since an electronic page printer can normally easily electronically reorder and recirculate the "original" pages being copied to "copy" and output them in precollated or serial page job set order, rather than making plural directly sequential copies of each page requiring postcollation and separate bins for each copy set in a sorter or collator.

A very desirable mailbox system feature is a "variable bin assignment" system in which many users can share one mailbox unit with only a limited number of bins by variable (dynamic) bin assignments and their electronic logging or tracking, with the bin assignment(s) for a particular user or group of users, depending on bin availability (the bins empty at any given time) rather then a fixed, permanent assignment of certain bins to certain users or customers. This greatly increases the effective capacity or the number of potential shared users.

A specific feature of the specific embodiment(s) disclosed herein is to provide in a sheet output mailboxing system for selectively collecting the sheets outputted by a shared users printer in an arrayed plurality of mailbox bins of a limited sheet capacity per bin, for collecting such output sheets therein in collated printer job sets of stacked plural said output sheets per job, and with sheet feeding means for sequentially feeding said output sheets from said printer to said mailbox bins so as to be segregated by bins by respective users of said shared user printer, the improvement wherein the mailbox bins are not permanently assigned to particular users, and are variably assigned, comprising a variable bin selector for selectably collecting plural said collated job sets of said shared printer output sheets in a selected bin of said array of mailbox bins; said variable bin selector providing for stacking a limited number of subsequent job sets from the same printer user on top of prior job sets in the same said selected mailbox bin; an electronic controller for controlling said variable bin selector for repeatedly variably selecting which ones of said plurality of mailbox bins will be temporarily assigned to particular said shared printer users; said controller collecting information as to which said mailbox bins have had job sets of another user stacked therein which have not yet been removed, in order to variably select other ones of said mailbox bins to be temporarily assigned to a particular said user; said controller selecting which ones of said bins will be assigned to a particular user in response to repeated determinations of which said mailbox bins are currently so available for stacking job sets therein, and controlling said variable bin selector means to collect said job sets of output sheets for that particular printer user in those selected bins; and a variable user indicator system repeatedly updated by said controller for identifying to said users which of said variably assigned mailbox bins contain job sets for a particular user wishing to remove job sets from said mailboxing system; thereby allowing multiple users to share said printer and said mailboxing system therefor even if the number of said shared users exceeds the number of said plural mailbox bins.

The following are further examples of some possible desired and/or optional features, individually or in combinations, for printer "mailbox" output systems, or multi-mode output devices providing that function.

Another very desirable and related "mailbox" feature is a "virtual bin" concept, in which the software in a programmed computer or controller controlling the mailbox sheet distributor puts the first job output of user A into an assigned bin X which is determined to be available. Then, if a subsequent job for user A will also fit into bin X, it is also put into bin X. If not, then the subsequent job for user A is automatically put into an assigned "overflow" bin Y, etc.. I.e., for each user, the number of assigned bins is automatically increased to meet the users need. Preferably, adjacent bins are used for the job overflow. Art noted re bin overflow features in general includes Xerox Corporation US-A-3,871,643 issued March 18, 1975 to W. Kukucka and T. Acquaviva; IBM US-A-4,522,486 to Clark et al. (using the term "virtual bin"); and US-A-4,134,581 to Johnson, et al. [See further below for the definition of this term herein.]

Another very desirable feature is to use "mailbox" bins to store plural (more than one) bound (e.g. stapled) sets in a selected assigned one or more mailbox bins (i.e. so that any particular user-designated bin can store plural stapled sets from the same or different jobs). [Note in this regard Xerox Corporation US-A-5,098,074, especially Fig. 4 and its description and the last paragraphs, and the corresponding abstracted "Xerox Disclosure Journal" publication Vol. 16, No. 5, pp. 281-283 dated Sept./Oct. 1991.]

Another desirable "mailbox" feature is to provide a modular integral unit for improved handling and organizing the sequential sheets output of a wide variety of printers, copiers and/or facsimile machines or combinations or multifunction "combo" units thereof, especially shared user and/or electronically connected interoffice "system" printer units.

Other options can include providing enhanced job set finishing functions. For example, stapling and/or other binding, punching, folding, special sheet inserts or booklet making, and mailbox sorting of either the finished or unfinished sets.

Optionally, a separate "gathering tray" may be provided for combining job outputs, in the order they were generated, from some or all of the assigned bins, removing the jobs from the bins and outputting them in a single stack. (The effect in this case is that the users will appear to nave a single shared bin of variable size.) However, the term "virtual bin" as used herein refers to one aspect of the "dynamic bin assignment" system taught herein, whereby assignment of additional bins for the same user can be automatically provided if the sheet capacity of one bin will be exceeded. This should not be confused with a different use of the term "virtual bin" to refer to systems in which jobs in various bins are automatically unloaded from the bins onto a common separate stack.

The present system is desirably usable for electronic mail hardcopy prints and/or other networked or shared user document prints in general. E.g., in a shared user, networked, printer environment, such as in a modern office environment, the printer can electronically recognize the sender or user terminal sending the printing job from network or document electronic information already available in said job. (Such shared printers may also have alternate scanner or floppy disk document inputs.)

It will also be appreciated that there are facsimile or other printer systems in which the messages or documents are electronically stored rather than printed immediately, in a print server or the like, and in that case, the designated printer or printers and addressees may be changed or forwarded by an intermediate terminal and/or programmed software, which here can be used to change the bin addresses. Furthermore, the job or cover sheet may contain additional encoded information for other copy or distribution controls.

Of particular background interest, job separation "mailboxes" *per se*, broadly speaking, are known. Unlocked or open bin copier or printer "mailbox" descriptions include US-A-5,098,074, see especially Fig. 4 and its description. In particular, it discloses automatic copier or printer output stacking of *plural* sets of prestapled, precollated, plural sheet copy sets into selected "mailbox" bins, i.e., more than one job set per bin. A printer mailboxing system with locking bins is the Xerox Corporation EPO application No. 0 241 273 published October 14, 1987.

The alleged utility of otherwise conventional existing sorters for [unlocked] printer output sorters or "mailboxes", and printer "mailboxing" in general, is briefly discussed in Col. 1 of US-A-4,843,434 issued June 27, 1989 to F. Lawrence, et al, by Gradco Systems Inc. (see below); and US-A-4,763,892 issued August 16, 1988 to H. Tanaka, et al..

The Canon Takahashi et al. US-A-4,051,419, issued February 26, 1985 and filed August 20, 1981, is of particular interest for its random bin access and an early teaching of collating paper output of either a laser printer or a copier with automatic bin input switching from detected full bins to bins from which the papers have been removed, for maximizing bins utilization and minimizing printing delays. The operation described is that for sorting (collating) not mailboxing of collated job sets. However, the bin and sheet path sensors described there (and elsewhere) may be used herewith, if desired. This same reference also teaches bin indicator displays.

US-A-4,691,914 discloses a random plural bin access [with plural solenoids] sheet receiver. It discloses sheet input from both the right or left sides, indicated as from a copier and a printer respectively.

US-A-4,830,358 refers to "mailbox" sorters merely in citing a prior US-A-4,288,070 to Fred R. Lagner [which does not itself discuss that] in Col. 1, lines 29-31. Said US-A-4,830,358 also says in Col. 1 line 44 that it provides a sorter in which the trays may be "randomly accessed", and discusses that further re a printer connection in at least Col. 11. Col. 8 bottom to Col. 9 top, et al.. This US-A-4,830,358 patent further discloses printer/sorter command signals and controls.

The US-A-4,843,434 filed November 17, 1987 and issued June 27, 1989 to F. Lawrence et al. has a brief discussion of "mailboxing" for electronic or laser printers in Col. 1, lines 28 et al., noting in particular there that: "mailboxing is more difficult, because the documents or jobs destined for different mailboxes may not and most likely will not be processed in sequence. Thus, mailboxing requires random access or positioning of the sheet feed for delivery to a selected bin or mailbox." [Col. 1 lines 37-42]. This specification then goes on to indicate that rapid bin movement is a problem for that in the prior art sorters, and that it provides high speed job separation and ease of random access operation.

Of further "mailbox" interest, in Seiko Epson Corporation US-A-5,141,222 issued August 25, 1992 by Shigeru Sawada, et al., (and its equivalent EPO Application No. 0 399 565 "Printer" published Nov. 28, 1990), a modular unit sorter is generally indicated in Col. 1 to be for sharing a printer with a plurality of users, sorting and compiling copies by user. It claims an output sorter having fixed trays and a pivotable sorter guide member for directing copy sheets to a

sorter tray. Each tray may also have a gate mechanism for retaining sheets in the tray. It is suggested in Col. 6 that a mailbox can be assigned or dedicated to each user, and used as a "mailbox" by entering an ID code and printing data. This reference is also of interest re detecting the fullness of a sorter bin and for delivering copy sheets to the next available sorter bin. i.e., also disclosed in said US-A-5,141,222 reference Col. 8 are means for detecting the fullness [reaching of sheet stacking capacity] of a tray and incrementing this sorter tray copy sheet guide to another (empty) sorter tray. As noted, another example of that is disclosed in Canon US-A-4,501,419, issued February 26, 1985 to Y. Takahashi, et al.

Note, however, that especially with stapled sets, as disclosed herein, where whole job sets may be put into a bin at a time (vs. sheets stacked in the bin one-at-a-time), the decision to put the next job in another bin should be made in advance, with knowledge of the size of the next job set versus the remaining capacity of the bin presently being used for job stacking.

Printer products noted with integral open sorter bins [the bin selection system is not known] include the Canon NP-9030 sold for several years with a sorter option; the Kyocera F-2010 and F-3010 laser printers with their 5 bin sorter option (since 1988?); and Océ van der Grinten Corporation's recently commercially displayed "6750" and "6800" printers configurable with either 20 or 40 bin optional programmable sorter/mailboxes. Toshiba and its OEM Genicon recently announced a 10 bin "mailbox sorter" for their network printers, supported by a Windows driver. The Toshiba user selects a bin number from the driver menu (not the network). Thus, users all have to agree among themselves who gets what bins. The Genicon system allows the network administrator to assign bins.

As noted, a desirable additional feature for mailboxing systems is to staple or otherwise bind, fasten or finish the sheets of each job together, so that plural finished sets are removable as such from the user's bin(s), maintained neatly stacked and separated from other jobs by being fastened. This can be done by precompiling and stapling sets before they are placed into mailbox bins, as in the above-cited US-A-5,098,074 to the same B. Mandel, et al..

Further as to bin locking, US-A-4,470,356 entitled "Word Processor-Controlled Printer Output Bin Lock Box", issued September 11, 1984, to Datapoint Corp., by D. Davis, et al., discloses a lockbox insertable and removable from an output bin. A security door is closed to allow removal of the box. US-A-4,437,660 entitled "Word Processor - Controlled Printer Output Scanner Mechanism", also issued March 20, 1984 to Datapoint Corp., is if particular interest as disclosing a scanning mechanism for scanning individualized output bins collecting laser printer output for determining each bins availability, the degree of fullness, and whether or not a lockbox is positioned in the bin. U.S. Defensive Publication No. T102, 102 entitled "Access Controlled Copier" Published August 3, 1982 by Albert Bolle, et. al., discloses sorter bins which can be locked to the user by means of a badge reader or the like. The user-entered identification data is entered and recorded on the first copy which is delivered to the locked sorter bin or bins. IBM Corp. US-A-4,414,579 entitled "Information Transmitting and Receiving Station Utilizing a Copier-Printer" issued November 8, 1983 discloses a secured mailbox located at the bottom of the collator. Xerox Corporation reportedly provided modified copier sorters with locked bins for at least the U.S. State Department many years ago.

On another optional or desirable feature, art relating to sorter bin assignment schemes wherein the bins have an associated LCD or the like type of visual display includes US-A-3,905,594 to Davis; and the above-noted US-A-4,437,660 to Tomkins et al; US-A-4,501,419 to Takahashi, et al.; and U.S. Defensive Publication T102, 102 to Bolle et al.. Also, Fuji Xerox Corp. FX-10475 Japanese Application No. S 59-55424, filed April 17, 1984 and published on November 6, 1985 as Kokai No. 60-167054.

There were also commercially available for many years sorters in which bins were sequentially or randomly programmably addressable by punched card, paper tape or keyboard controls, and/or a programmable mini-computer with displays and memory for tray address and sheet count information, as noted in US-A-3,905,594 to E.D. Davis (Norfin, inc.) issued September 16,1975. The latter also suggests printing and feeding binary address printed cover sheets in Col. 3, top, and Col. 8, middle.

When a sorter unit is to be alternatively used for, or converted to use for, a printer mailbox unit, it may be desirable to increase the available sheet stacking space between bin trays or shelves to increase bin capacity. Moving or removing sorter bin shelves for doubling or tripling the number of multiple copies which a particular bin can receive is taught for a sorter *per se* in US-A-3,907,279 issued Sept. 23, 1975 to J. H. Erwin by AM Corp. See especially Col. 3. Doing so for different numbers of copies or documents to different users in preprogrammed bin sequences is suggested in Col. 1.

The present invention will be described further, by way of examples, with reference to the accompanying drawings (approximately to scale) wherein:

Fig. 1 is a partial frontal schematic view of one embodiment of the subject "mailboxing" system unit, with an exemplary display panel and keypad, shown operatively connecting with and receiving the output of copy sheets of a conventional shared user printer, shown schematically. This mailbox unit is shown here with an interface module at the right hand side for transporting output

from the left end or side of the printer apparatus [right side printer output may alternatively be received directly at the left side of the mailbox unit, as shown in other Figures];

Fig. 2 is in an enlarged partial frontal schematic view of the exemplary moving sheet selector, compiler, stapler and job set ejector unit integral the mailbox unit of Fig. 1;

Fig. 3 is a more detailed partial internal perspective view of an exemplary sheet distribution (bin selection) system which may be used in the exemplary mailboxing system of Fig. 1 and other Figures, also showing part of said exemplary moving compiler et al. unit associated therewith;

Figs. 4A - 4C are three schematic frontal views of modifications of the modular mailboxing system of Figs. 1-3, showing how it can be rearranged into different configurations by changing sub-modules, such as by adding an open top tray and a selectable mixture of locked and unlocked mailboxes at different locations, and a large capacity stacking tray, with or without a tray elevator, all interchangeably mounted on the same support frame [Fig. 4C is also shown with a right hand and top interface module for sheet input feeding from a printer left side output similar to that of Fig. 1];

Fig. 5 illustrates exemplary electronic information interchanges between the exemplary mailboxing system controller and the associated printer controller and/or its print server;

Figs. 6-8 together provide an exemplary flowchart and electronic signals logic diagram for determining variable bin assignments for the subject mailboxing systems, which may also control the user bin display and bin unlocking, as also described herein;

Fig. 9 (A and B) is another example of a mailboxing system, with a job set compiler/stapler which may be stationary in a mailboxing unit with an array of vertically movable bins, [or with partial movement of both]. 9A shows a job set being compiled, and 9B shows the compiled set being ejected into the adjacent bin (using set ejector pushing fingers in this embodiment). Two optional sheet inserters for book covers or other inserts are also schematically shown here in a replaceable top sub-module [which could also be provided in other embodiments herein];

Fig. 10 is a partial, broken-away, enlarged perspective view of one example of bin "privacy doors" usable with any of the illustrated mailbox embodiments to provide so called security or lock-box mailbox bins with restricted user access, and also illustrating an integral job set lifter system for automatically lifting up the front of a job set in a bin with an opened bin door;

Figs. 11A - 11C are side views of three sequential door opening steps for the mailbox privacy door and set lifting system embodiment of Fig. 10;

Figs. 12A and 12B illustrate in two positions a slightly different alternative embodiment of the set lifter system of Figs. 10 - 11 and also illustrates a dual mode sensor system for both bin-empty and bin door closed sensing, in which a flag moves with the bin door opening 12B to block the sheet sensor of Fig. 14 from looking up into the bin;

Fig. 13A and 13B show an automatic spring-loaded, solenoid released, bin door opener system, also showing the set lifter of Figs. 10 and 11;

Figs. 14 - 16 show an exemplary bin-empty (available bins) sensor system, which, as shown in Fig. 16, as well as Figs. 12 and 15, can also signal bins which are open. The logic diagram of Fig. 15 is usable with any such system, and in connection with Figs. 6 - 8, as indicated there. Fig. 16 shows spring-loaded mailbox bins which automatically slide out like drawers when released by solenoid latches, as an alternative to privacy doors which pivotally open in bins which are stationary as in Figs. 10-13;

Fig. 17 is another alternative mailbox module wherein the sheet deflector (bin selection) gates include the partial compiler shelf which extends into the selected bin;

Fig. 18 is another mailbox unit embodiment, shown with its associated printer, with flashing variable user name displays next to each job-loaded mailbox;

Figs. 19-21 show another flowchart, providing one example of logic and operations for an exemplary mailbox unit's sensors and user indicators system; and

Fig. 22 is a schematic overall view of one example of an electronically networked system by which a plurality of users share an electronic printer.

Turning now to the exemplary embodiments of a mailbox unit shown in the Figures, it will be appreciated that these are merely examples of the claimed system. The printers to which the mailbox system may be operatively connected are only partially shown, or not shown, since various printers may be so connected, with little or no printer modifications, as part of various systems. Preferably the mailbox unit has an input which adapts or adjusts to various printer output levels, or an interface unit or interconnect transport may be provided in a known manner to sequentially feed the printer output sheets from the printer into the sheet input entrance of the mailbox unit. The illustrated mailbox bins, compiler, stapler, etc. illustrated or described herein are exemplary, and may very considerably. The general reference number 10 will be utilized below for the mailbox unit or module, even though modifications thereof are variously show herein. Likewise, the general reference

number 11 will be used throughout for an individual mailbox (bin).

The disclosed systems provide for stacking the sheets sequentially outputted from the printer in separate job sets into one or more temporarily and variably assigned "mailboxes" of a "mailboxing" job sorting accessory unit having a number of variably assignable "mailbox" bins. In particular, there is disclosed in examples herein a dynamic "mailboxing" unit and system for dynamically separating into mailboxes by currently assigned users the sheet outputs of various users of a shared users printer (including facsimile receivers or combination units). A variable display indicates the bins into which that particular user's jobs have been placed last and not yet removed. These may be plural pre-compiled and/or prestapled job sets all stacked in one bin. The exemplary disclosed system may also provide a bypass for sequentially stacking unstapled user sheets directly in a mailbox without compiling and stapling. Also disclosed is automatic overflow assignments of additional temporarily designated bins for identified users, as needed, to provide effectively unlimited or "virtual bin" plural job stacking. An integral moving sheet deflector, compiler and stapler unit is shown for collecting, compiling, and optionally stapling, and ejecting job sets of sheets for separate designated users into one or more of these discrete but variably assigned "mailboxes". The disclosed "mailboxing" units may also have "privacy doors" locking for restricting access to at least some of the mailbox bins, with electrical door unlocking of selected bins in response to entry of a user access code, and other user features.

First, however, further by way of background, examples of overall office or other systems and/or networks in which one or more such mailbox units and their associated printers may desirably be incorporated will be discussed. As discussed above, a shared user printer output job can be generated and get to a mailbox unit from various sources. For example, customers can send a job to a printer from their respective workstations, e.g., from a screen display menu or job ticket, as further discussed herein.

Another potential job source is a facsimile document or message addressed or directed to that printer, preferably with a designated recipient's mailbox or other user code number sent with the fax message.

A print job can also be sent to another person's mailbox bin directly, without going to their workstation. For example, someone might want to send hardcopies of a contract that needs to be signed to other system users. Rather than just electronically mailing each of them an electronic copy, a print order with their mailbox designators can also or alternatively be sent to the printer for printing so that hardcopy is immediately printed and placed in mailbox bins assigned to them, as described herein.

Describing now in further detail are the exemplary embodiments with reference to the Figures, first there are shown various embodiments of a stand-alone printer output "mailbox" job sorting unit 10, with plural bins 11, and an integrated job compiler finisher unit, such as 90, by way of examples thereof. The conventionally sequentially received hard copy of plural page documents from a pre-collation output electronic printer or the like is fed into the mailbox unit 10 and automatically controlled for the particular bin 11 assignment destination of the job sheets. The mailbox unit 10 directs all designated sheets of a users job to available bin or bins 11 temporarily assigned to that printer user based in availability.

As noted, the disclosed mailbox unit 10 can be a universal or dedicated stand-alone unit that is attached to, or even simply moved next to, the output of almost any conventional printer. Plural units 10 may be ganged in series like plural sorters, if desired, for increased numbers of bins, using conventional sheet pass-through feeders and gates. As is well known in sorting in general, sorter bin units can be extended or serially connected in this manner to provide more available bins, if desired. The job sorting unit 10 can take sheets inputted at one or more sheet inputs 20 from various printer outputs, including multi-functional units. The input 20 may, if desired, be provided with a pivotal or otherwise vertically adjustable input ramp and/or feeder, which may be in an interface module, to align with various levels of printer outputs. Left and right side sheet inputs may be adapted to operatively engage with the sheet output of the shared user printer at different levels on either of two opposing sides of the mailbox module so as to universally accept many different printer outputs and output levels. The input 20 may include, for example, an input feeder 24 to first feed the incoming sheets to the top of the unit. As illustrated here, that may employ the outside flight or bight of the conventional vertical frictional sheet transport belts 26 feeder as shown in Figs. 4A, 4B and 9, for left-side sheet input, or an interface module 16 or other vertical feeder for right side input as in Figs. 1 or 4C. Since the output of the printer may be acquired sequentially as individual unstacked sheets as it outputs, no sheet separator is required for the unit 10, and thus a very simple input feeder can be used. It can even be positioned to reach into the pre-existing sheet output tray of the printer to pull the sheets out of that tray. The unit 10 input feeder 24 preferably has a conventional sheet input sensor actuated by sensing the entrance of a sheet lead edge into a sheet entrance path 20.

The internal sheet feeding in the mailbox unit 10 can utilize various known sorter sheet transports, many of which are shown in cited art herein. Once each output sheet of the printer has been acquired by the input feeder 24 or the like of the unit 10, the further feeding may be done conventionally by the illu-

strated rollers 25 engaging belts 26 to form feed nips feeding the sheet along the belts 26 until the sheet meets a bin selection and feeding means 30. Here, preferably the inside flight or bight of the moving belts 26 carries the sheets thereon downwardly from the top of the unit past a series of gates or sheet deflectors 32, until the sheet is deflected into a selected bin 11 when the sheet reaches an opened gate 32 adjacent the selected bin or tray 11 entrance, as further described below.

Various components of the mailbox unit 10 can be conventional, even commercially available, except as controlled and modified as described herein. Various feeding and gating arrangements whereby inputted sheets are fed to and gated into selected bins, by a moving gate or separate associated bin gates, as here, with a sheet deflector mechanism, from a sheet transport, are well known in the art. Shown here is a movable frictional belts 26 transport system and plural stationary but pivotal sheet deflectors 32 to selectably deflect sheets from the feed belts 26 into the selected bin 11.

As noted, the entire operation of the exemplary mailbox module unit 10 here may be controlled by an integral conventional low cost microprocessor chip controller 100, conventionally programmable with software for the operations described herein. Such a system has ample capability and flexibility for the functions described herein, and also for various other functions described herein, if desired, such as jam detection and jam clearance instructions.

In the system herein, desirably several, or all, of the bins 11 are partially or fully enclosed, with a normally locked privacy door 52 openable on one side (or end) by a bin door unlocking system 50, as will be further described.

Optionally, the top bin or tray 11a of the unit 10 may conventionally provide an open or "public" bin. A top bin is preferably used for undesignated or unknown user's jobs, jam purges, etc. since it is not limited in stack height by any overlying tray.

Some examples of the various mailbox unit 10 reconfigurations possible with this system are shown in different Figures especially Figs. 4A - 4C. As shown, the mailbox module unit 10 proposed here flexibly enables a wide variety of output configurations that can accommodate various requirements. The numbers of relatively low capacity (e.g., 100 sheet) mailbox bins provided for a number of individual printer or fax shared users may be fabricated in modules of 4 or 5 bins each which can be easily added or removed from the unit 10 main frame. However, as shown, one or more illustrated stacker tray 14 systems can also be mounted (vertically superposed) onto the same frame in place of one or more of these mailbox bin modules, to provide a large vertical free space for providing high capacity stacking. This desirably provides multiple stapled sets stacking capability from the same compiler unit/stapling carriage such as 90 that also interfaces with the mailbox bins. That is, the inputs to stacking trays 14 are approximately vertically aligned with the inputs to bins 11. This accommodates host-connected printers where high capacity stackers are desired. Especially, printers used as "departmental" printers rather than individual addressed mailboxes, so as to require less bin output locations.

However, here, instead of the stacking tray 14 conventionally moving down as it fills to maintain the top of the stack slightly below the compiler exit level, the present system can desirably move the compiler/stapler unit 90, or the like, up as tray 14 fills. This desirably allows a simple fixed tray 14 to be used, with no elevator mechanism for that tray 14, by using the same bin indexing elevator system as is also used here to direct jobs from the same compiler unit to selected mailbox bins 11. Alternatively or additionally, conventional elevator-moved stacking trays can be used, like those described in US-A-5,098,074 [34] or US-A-5,137,265; 5,026,034; 4,541,763; or 4,880,350.

Another optional feature of the mailbox unit 10 (or an optional associated interface unit 16 between the printer and the mailbox) is to provide optional additional on-line sheet treatment subsystems in the mailbox module input sheet path upstream of the bins; such as a sheet rotator, sheet inverter, sheet hole punch, signature folder, Z-folder, sheet inserter, purge tray, etc., or some combination thereof. [These are all well known, per se, and need not be shown in detail here] They may be located in, e.g., a removable and replaceable top (or bottom) sub-module 10a of the mailbox unit, so as to be able to easily meet various customer needs by easily substituting one such functional sub-unit for another. For example, a sheet rotator may be located in the mailbox sheet input path as shown at 17 in Fig. 1. In general sheet rotators operate by moving one side of the sheet faster than the other, by holding or much more slowly feeding the sheet in one sheet feed nip on one side of the feed path than the other (as with a variable speed motor or drive) until the sheet rotates 90 degrees. This allows a choice of sideways or end-wise sheet bin 11 stacking, and/or selection of the side of the set to be stapled. In addition to the above-cited Mandel et al. U.S. 5,090,638, other sheet rotators are shown in US-A-3,861,673; 4,473,857; 4,830,356 and 5,145,168; and some of them are shown in interface modules. EK US-A-4,602,775 and Fuji Xerox US-A-5,172,162 also show an interface module with an inverter or other sheet processor between a printer or copier and a sorter, finisher, or other output unit. Examples of on-line Z-fold and other sheet folder systems are in US-A-5,026,556 issued Dec. 31, 1991 to the same B.P. Mandel. Examples of on-line sheet hole punching units include Xerox Corporation US-A-4,819,021; and US-A-4,998,030 and 4,763,167. Examples of

sheet inverter patents include Xerox Corporation U.S. 3,833,911; 3,917,257; 4,359,217; and 4,673,176. The first two show an optional inverter in association with a sorter, in the Xerox Corporation "4500" copier. Examples of cover or other sheet inserters, etc., are disclosed in the Xerox XDJ publication of November/December 1991, pages 381-383; and US-A-4,626,156; 4,924,265; 5,080,340; and 4,602,776. An example 18 here is shown in Fig. 9. Sheets may be fed from either of the illustrated Fig. 9 sheet trays and feeders at times selected by the printer or controller 100 to be interposed (interleaved) with job sheets from the printer going into the same sheet path to the same compiler/stapler.

If a large e.g., 43cm (17 inch), sheet is signaled by the printer as being sent, or detected by the mailbox sheet entrance sensor, then such a sheet can be rotated by a sheet rotator such as 17 or the like in the sheet path as described above, so as to stack short-edge first in a bin. Alternatively, if a sheet folder is provided in the sheet path, the large sheet can be folded before stacking. Thus, the mailbox bins need not be oversized just to accommodate such abnormal large size sheets.

As shown in Fig. 1, the sub-module 10a can also provide an alternate, gated, by-pass sheet feeder path 12 on through the mailbox unit into another mailbox unit, for increased bin capacity or further such sheet processing options in that further mailbox unit.

These optional additional sheet operating features may desirably be assisted by a unit 10 sheet feeding system in which inputted sheets are first fed up to the top of the unit 10 to submodule 10a (if any) in one sheet feeding path, before being fed down in another sheet feeding path to the bin selector system and/or compiler/finisher unit, as described [or, vice-versa for a bottom sub-module].

These replaceable sub-module features can be provided here with either left or right side sheet input, yet can use the same mailbox unit frame and paper transports in any of these "universal" mailbox unit configurations. That is, the mailbox module can have a superposed array of plural mailbox print job collection trays for collecting the sheet output of a shared user printer, and also have a replaceable upper or lower vertically modular sub-module. The mailbox module can have both a right side and a left side for feeding sheets respectively from either left or right side sheet inputs vertically to the sub-module. The replaceable sub-module may have one or more interchangeable sheet processing-modules in the mailbox module sheet path to sequentially operate on sheets in that path; such as a sheet rotator, a sheet inverter, a sheet hole punch, or a sheet inserter. The mailbox module has a third generally vertical sheet transport path from this sub-module to the selected print job sheet collection tray. As noted, the mailboxing module also desirably has a mounting frame on which a variety of sheet collection trays may be different removably mounted at variable positions.

In the illustrated mailbox sheet diversion system 30 example of Fig. 3 as well as Figs. 1 and 2, plural sheet diverter gates 32 are commonly mounted in line on rotatable shafts 33 to define plural gate units 34. The number and spacing of such gates/shaft units 34 equals the number and spacing of the bins 11. They are closely parallel to, and vertically spaced along, the plural belts 26 sheet transport. The same shafts 33 may also support the sheet path idler rollers 25 forming the sheet feeding nips with that side of the belts 26 as shown. However, instead of being conventionally directly adjacent the bins, the diverter gate units 34 here are horizontally separated from the bins by the space for (width of) the moving compiler/stapling unit 90. When one set or unit 34 of the pivotal gates 32 is pivoted, the top surface 32a, including end fingers 32b of each gate 32, acts as sheet deflectors to deflect sheets off of the sheet transport belts 26 at that gate unit 34 location, and into (or through) the adjacent compiler unit 90 at that selected bin 11 location. The selected single line of gates 32 (one gate unit 34) is pivoted on shaft 33 by direct mechanical engagement of a cam actuator 35 on the elevator/compiler unit 90 with a gate opening cam follower 36 on the pivotal gate unit 34 shaft 33. This pivots said end fingers 32b of that set of gates 32 out through spaces between the vertical sheet transport belts 26 so that these fingers 32b are positioned to catch the sheets on the top surface 32a and deflect them off of the belt transport and into the compiler unit 90.

Meanwhile, all the other pivotal gates 32 are all gravity-loaded into a closed (vertical) position, in which their rear or left sides 32c function as sheet guides or baffles to maintain sheets on the transport belts 26 vertical path passing thereby.

When the compiler elevator moves the compiler unit 90 on to a different selected bin position, the previously opened adjacent bin gates reclose, and that other newly selected set of 34 gates 32 is pivoted open. This eliminates the requirement for multiple solenoids, one for each bin, and their wiring for bin selections. Here there are plural, but dual mode, gates, which are individually cammed open one at a time by a moving compiler unit, which also forms part of the sheet path into the selected bin. Thus, this unit 90 here actuates, and forms part of the sheet diversion and bin selection system 30. [Note, that moving gate sorters (e.g., Norfin Co. Snelling, et al. US-A-3,414,254) are known in the sorter art. However, typically these have only a single non-pivotal gate, *per se*, having one set of non-pivotal deflector fingers between the bins and the belt and/or vacuum sheet transport, always extending into the belts, which single gate is moved up and down past the bins by an elevator mechanism]. In contrast, here the compiler unit 90 is vertically moved up or down to its adjacent

bin, not the gates. Similar known elevator systems may be used for the compiler/stapler unit here, such as elongated screw shafts rotated by a motor at their top or bottom, or a driven cable belt and pulley system. In the latter case, the compiler unit can conventionally slide up and down on conventional vertical elevator rails or smooth cylindrical rods.

Referring particularly to Fig. 2, as well as Figs. 1 and 3, the example here of a sheet job set compiling and stapling and/or ejecting system 90 herein per se may be, for example, similar to that disclosed and described in Xerox Corporation Application Serial Number 07/888,091, filed May 26, 1992, by the same Barry P. Mandel, et al.; [Another such compiling and stapling system is disclosed in his above-cited US-A-5,098,074]. The sequentially incoming sheets from the sheet deflecting or bin gating system 30 here are fed into an input feeding nip 91 of unit 90 in all cases. However, then here the sheets are either fed directly through the compiler/stapler unit 90 on into the adjacent bin 11 without compiling or stapling, as shown in the dotted line path in Fig. 1; or the sheets may first be compiled in a compiler tray 92 by dropping and being fed backwards and registered against the downhill stacking rear wall 92a of the compiling tray 92. During this set compiling and registration, a compiled set discharge arm device 93 (with its driver roller 94) is in an up position out of contact with the discharge idler roller 95 (at the compiler tray 92 outlet), as represented by its illustrated solid line position. That is, during this compiling cycle, this set discharge arm device 93 is in an up position not in contact with any of the sheets in the compiling tray 92. [Note that if single sheets are being sequentially fed straight on through the compiler 90 to the bin 11 without compiling (in a bypass or sorting mode), rollers 94 are held down in engagement with rollers 95.] Once the incoming sheet has been discharged from the sheet entrance rolls nip 91 and drops onto partial compiler tray 92, and slides downhill, the top surface of the incoming sheet is then also contacted by a rotatable frictional flexible compiler belt 96, causing the sheet to be driven back and downhill until it is fully registered against the rear wall 92a of the tray 92. This type of compressible open or "floppy belt" jogger or compiler assistance is further disclosed in Canon US-A-4,883,265, (issued November 28, 1989 to N. Iida, et al.), and US-A-5,137,265, and EPO 346851. Each subsequent job sheet is compiled on top of the prior sheets on tray 92 in this manner. A conventional lateral registration tamper can also be provided, as in the cited art thereon. That is, once each sheet is discharged and rear registered by the rotation of the floppy belts 96 against the topmost surface of the sheet in the compiling tray 92, the lateral tamper engages to shift each sheet to a lateral registration edge of the tray 92. Because the floppy registration belts 96 are so flexible, and are held only at their top, they are easily deformed in the lateral direction. Note that even during this compiling operation the sheets also partially extend and hang out into the adjacent bin 11, saving overall mailbox width. That is, the compiler tray 92 is only a partial sheet supporting shelf for most sizes of sheets, as in the above-cited Mandel US-A-5,098,074 or Canon US-A-5,137,265.

Although not shown in the system 90, it may be possible to alternately use an elongated generally horizontal extension of the gates 32 as at least a part of the partial compiler tray 92, if desired. It can be constructed to pivot partially into the selected bin for compiling, if desired, as shown in Fig. 17.

Once the compiled set is completed (the entire job set is stacked) and both longitudinally and laterally registered, the compiled stack may then be attached together, by means of a stapler 97, or stitcher, or other suitable set binding device, such as is shown in the art cited herein. As shown in that art, and otherwise well known, stapling or other binding may be in one corner of the set, or along one edge, or along a central spline as a saddle stitch. However, set stapling is not required here. Whether stapled or not, the discharge device 93 is then automatically lowered onto the top surface of the completed compiled set to form a nip gripping the set between its discharge roller 94 and eject idler rollers 95, as represented by the phantom line position of 93. The compiled (and normally stapled) set is thus driven out of the compiling tray 92 and fully into the adjacent bin 11 to stack on tray bottom 13.

The set discharge device 93 here is exemplary. Set discharge could also be accomplished by a transport belt, mechanical pusher fingers [as in Fig. 9, shown moved out in 9B relative to 9A], or other suitable set transport device. Here, after a set ejection, the sheet discharge nip 94, 95 opens as the device 93 lifts to return to its initial position, and the compiling apparatus 90 is ready to compile another subsequent set of copy sheets thereon after being moved to another bin.

Thus, there is provided integral the mailbox unit a single repositionable compact compiling/stapling unit 90 for stacking, registering and attaching sets of printing machine output. The copy sheets may be discharged into an inclined compiling tray and each sheet assisted to be registered. Each sheet may also be laterally shifted by a tamping mechanism. The compiling tray level and/or sheet input level can be adjustable, if desired. Once a complete set of sheets has been stacked and fully registered, the stack may then be attached by stapling or other means, or not, and discharged as a set from the compiling tray into the adjacent bin. The system then returns to its initial position to sequentially accept and stack the next set of copy sheets. However, as noted, this is a plural mode operating system, which can also function as a single sheet pass-through feeder, feeding sheets di-

rectly sequentially into the bin 11 to stack therein.

As noted above, if desired, the compiling/stapling unit 90 can increment up after set ejection by a vertical distance related to the set sheet count, so as to eject the next set into that same bin from a higher level, for stacking assistance, especially for a higher capacity bin or a stacking tray 14 as discussed further herein.

As shown in Fig. 1, on a convenient upper surface of the mailbox unit 10 may be located a conventional numerical keypad 102 and adjacent LCD or other operator display 104. Both are operatively connected with the mailbox unit 10 controller 100, as will be described. The term "keypad" as used herein is intended to encompass any simple or low cost type of conventional numeric or alphanumeric keyboard, CRT touchscreen areas, or other keystroke capturing devices, or voice input alternatives. Also, the keyboard in the printer user interface (UI) may be used.

Simple programmed user interfaces (all with the same, single, simple keypad) which are also usable with the disclosed mailbox units. Passwords can be changed at any time desired, except during receipt of a print job. Passwords are desirably required to be entered for unlocking any locked bin. Initially assigned four number or other passwords can be readily changed using conventional software techniques. In such control software, an old password can be replaced by a new password and the software can match the password entered by a user with the one saved in the memory for that user. Matching of a password prompts a locking mechanism to unlock the specific bin. Different passwords are normally needed for different user bins, but can be shared, and/or combined into "master key" passwords. A bin privacy door locking system, such as the one's described herein, can allow several bins to be automatically opened at once or one by one after entering the passwords. If desired, a separate key operator accessible mechanical unlocking system for all the bins (as by pivoting open the entire side of the unit), can also be provided in case of jams or power failures.

An alternative system of changing passwords is to send it via the system network, and/or use a printer encoded cover sheet, rather than a keypad entry. A pre-arranged or specially printed code pattern on a cover sheet from the printer can be read by the optical sensors in the sheet input 20 connected to the controller 100 to tell it to read other subsequent marks on the same or a subsequent cover sheet so as to enter that information into memory as a new password, rather than read the marked or printed pattern as a job bin assignment cover sheet code.

The user pin or code number can be the users existing network entry or "log on" password, identifiers or addresses. As previously noted, systems user identifiers are already automatically associated with each print job from that user in existing systems.

This bin locking and unlocking system may preferably, but need not necessarily, require separate, individual solenoid or cam operated latches for each bin, as shown, for example, in Figs. 13 and 16. Movement of the compiler unit can also be used to provide bin unlocking by camming open bin door lock latches, for example. Another example of an electrical locking and bin unlocking system is described in the above-cited EPO published application No. 0 241 273.

As shown, for example, in Fig. 13 or Fig. 16, the bin locking and unlocking system 50 may comprise simple solenoid bin door latches 54 with simple spring loading to pop each selected door 52 open, and conventional cam or door striker relatching when the door 52 is manually closed. Sensors 55 may be used to tell if that door 52 is open or closed, such as conventional optical slot sensors which are blocked by the illustrated tab on the door being in the sensor slot when the door is closed. However, as also disclosed herein, this extra sensor and its connection to control 100 is not required, since a system of dual mode sharing of the "bin empty" sensor for this additional function is also disclosed herein.

Bins with doors which are open signal controller 100 to not feed further sheets therein until they are closed, for jam and safety reasons. A function of locked or restricted access bins with normally closed access doors is to prevent users from putting their hands into a bin area where and when the compiler/stapler unit is operating there or in an adjacent area, or at all, if desired. i.e., an immediately subsequent print job for the user unloading their bin can be routed to another, newly assigned bin, or the printer can be directed by controller 100 to stop printing any jobs for that user, or the printer can be directed to stop any printing until all bin doors are closed. Of course, separate safety switches can also be used.

There are various ways in which customers can be directed or assisted to find their "mail" at their assigned mailbox 11 locations. Automatic bin door opening is desirable for that, and is discussed above and below. The customer can additionally or alternatively look at the mailbox user interface (UI) liquid crystal (LCD) 104 or other display. The UI 104, when actuated, may, if desired, scroll through all the various customer names and bin locations of customers currently having jobs in the mailbox unit. Or if anonymous security is desired or selected, the user can be required to enter their access number in order for the job bin(s) location to be displayed. As noted, if locked bin security was designated when sending the job to the printer, the customer can enter a pin (code) number, and the UI can then indicate the location of their job and also unlock those bin(s).

Another optional user signaling feature is for the mailbox unit to have a conventional beeper or other audio signaling device to tell the operator or user to unload bins when (as soon as) his or her print a job is

completed (fully stacked in the assigned mailbox bin or bins). This may be in addition to the visual display indicating which bins should be unloaded. This is particularly useful if the user is standing by the mailbox unit while that user's print job is running as in a "print on demand" mode, since the locked bin doors will preferably remain locked until the last sheet is in the last assigned bin.

The system can also automatically generate a network message back to the job senders terminal, if desired, as soon as a print job is completed and in a bin, so that the users screen displays a status message like "your job is in bin #3"; or "the printer is out of paper"; or the like. Or, as noted below, voice-mail may be used for this.

Presently available voice-mail systems, such as Xerox "V-Max", already have the capability of triggering pre-stored electronic messages to multiple voice-mail recipients in response to dialed in code numbers (or time events) to telephone addresses, which may also be pre-stored in the central voice-mail computer. In the present system, the controller 100 can auto-dial such voice mail trigger signals for sending a pre-stored mailbox job receipt voice mail message of the mailbox unit location and/or bin location.

Although a central LCD, CRT or other shared common display 104 is preferred, and reduces wiring and hardware, the system may, if desired, further optionally include the lighting of indicator lamps on or adjacent the user's bin, to direct the user to the proper bin to be unloaded. [Note, in this regard, the sorter bin indicator light art cited above.]

If a higher level "print on demand" security is chosen by a user, those jobs may be electronically stored in the printer or print server buffer memory but not yet printed. That customer would enter their his or her security number, and their jobs would then automatically be placed next in the printer print que (number one in priority), so as to start printing and sending those jobs to a mailbox. The mailbox UI could then also display the estimated time of arrival (ETA) of their job in the bin, as well as the bin number(s) where the job will be placed.

As noted, once customers remove their jobs from their bins, a bin empty sensor indicates to the system controller that those emptied bins are available for new job use and/or user re-assignments. Specifically, an in-bin sensor system determines "mailbox" availability.

A unique bin empty sensor system 110 is shown here, in Figs.14 - 16 in particular. Here, a single small infra-red or other optical sensor unit 112 is mounted in each tray bottom 13 in a single aperture 13a. Each single unit 112 has its light beam transmitter 112a on one side and its light sensor (receiver) 112b on the other side. This is so that the light beam from one unit 112 in one bin floor 13 shines up [or down] to the light receiver 112b in the next unit 112 in the bottom of the next bin, and so on. If that bin 11 has any sheets in it, the sheets block the light beam, and the non-receipt of the light by receiving unit 112 so signals. Thus, only one single small integral sensor package 112 and connecting leads is required in each bin or tray 11, with a single wire harness and connector, rather than two units or housings and two wiring sets per bin. Thus, the "bin empty" sensor system 110 disclosed herein can reduce hardware and wiring. To express it another way, a single sensor unit 112 in the bin floor 13 transmits one light beam 14 from a light transmitter 112a to the light receiving sensor 112b in the next adjacent bin in one direction, while that same sensor unit 112 also normally receives another light beam from the opposite direction from the sensor unit 112 in the oppositely adjacent bin, unless that other light beam was interrupted by sheets in the oppositely adjacent bin. That is, here each emitter/detector unit 112 works in cooperation with the adjacent said units 112 in the bins above and below, not with itself, as in typical optical sensor units. Merely as examples of an optical emitter and detector which can be used are an Optek No. OP298 and an Optek No. OP555, mounted as shown in Fig. 14 in a plastic block with smoothly sloped ends or sides in the paper feeding direction so as not to catch sheet ends. As shown, the top of each unit 112 is preferable level with or below the sheet stacking surface of the bin tray bottom 13, so as to not interfere with sheet movement into or out of the bins.

As shown in Fig. 14, to compensate for the angles of the bins, yet allow perpendicular emitter beams and mountings in the bin trays, these sensor units 112 may each be offset from one another along the bin trays by a distance S which is equal to D sin(a), where "D" is the vertical distance between bin trays and "a" is their angle from the horizontal. Or, they may be mounted sideways, as in Fig. 16.

As noted, this bin empty sensor system 110 can additionally provide dual-mode functionality, by also sensing a drawer or bin opening, as well as unremoved sheet jobs, in individual bins, using the same sensor unit 112. That is, the same light beam blocked by sheets in the bin can also be blocked by the opening of the door to that same bin. [This is discussed further herein in connection with the disclosed bin privacy door systems.]

An important aspect of the novel "dynamic" (variable) user bin assignment system herein is that each "mailbox" or separate bin to be utilized therefor is frequently checked (updated) for reassignment of that bin to a new user. That is, reassignment to other users of bins which have since become available by the removal of all the printer output sheets therefrom by the previous user of those bins. Unlike a sorter or collator, it is not necessary to free up (empty) a whole series of bins. This is a dynamic mailbox system in which any one free bin can be fed job sheets, even if that one empty bin is between other, unemptied, bins.

With this system, users do not have consistent bin assignments. Bins are assigned on a "first-come-first-served" basis, with the printers print job information. [The bins assigned are then stored in memory, to be identified whenever jobs are retrieved.]

This is enabled by the above described or other job-sheet-switchable "bin empty" sensors for each mailbox bin, which are electrically connected to the mailbox controller 100. See especially Figs. 14 - 16, and also Fig. 12. The mailbox controller periodically interrogates these bin-empty sensors 112 to see which bins 11 are now empty. This interrogation is preferably done each time the printer and/or print server is sent (and/or is preparing to print) a print job. See, e.g., the flowcharts of Fig 16, Figs. 6-8, Figs 19-21 and also the electronic data information exchange illustrated in Fig. 5.

Various other "bin empty" sensors are taught in the cited and other art. However, it should be noted that many of them optically look through a set of several, or all, of the bins, not individual bins, or have other undesirable features such as switch arms that can become bent by paper jam removals. Typical emitter/reflector sheet sensor systems are undesirably error prone with curled or bent paper in the bins changing the distance therefrom, or paper lint or torn paper scrap blockage. In contrast, here the sensor emitter beam passes vertically up through the entire bin space, for transmissive, not reflective, detection, before it is detected, and the detector is not in a position to be blocked or contaminated.

As noted, a visual interactive indicator for guiding user bin unloading may desirably be provided by automatically opening the privacy doors 52 of the users bins needing unloading when the user enters his or her access or unlocking code. Automatically unlocking and at least partially opening the locked bin doors is preferred, since the opened doors clearly help show or guide the user to the correct bin or bins. Also, the operator can remove the job sheets from inside the bin with one hand, rather them having to use another hand to hold the bin privacy door open. This automatic bin door opening can be accomplished as shown in Fig. 13, for example, by a spring-loaded bin door which pops open by spring force when a simple solenoid escapement latch or the like is released by the solenoid receiving an electrical unlocking signal from the mailbox controller. Or, instead of pivotally opening bin doors, the bins themselves may open by sliding out like individual drawers. As shown in Fig. 16, after a user drawer has been released by a solenoid latch, it may pop open a short distance by spring force, and then be operator opened manually the rest of the way for job removal. Then, when it is pushed closed, it relatches like a conventional door.

As shown in the flowchart herein, the mailbox unit described herein is desirably preset in its controller software to use the above-described dynamic bin assignment for all bins as the automatic default. However, customers can optionally partially override that by a simple software key entry option which pre-assigns one or more bins to a specific user, so that other users cannot use that bin [no other users' print jobs are sent to that bin] until that special override is deleted, or a re-assignment of that bin to another user is entered in the controller. [Or, a user may similarly chose to have all of their print jobs sent to an open bin or common stacker rather than a separate locked or unlocked mailbox until further notice, e.g., if they will be away for a while, or elect to send all their all print jobs to someone elses mailboxes, such as a secretary.] However, all remaining mailbox bins not so specially preassigned preferably remain free to be dynamically variably assigned.

The disclosed dynamic mailbox assignment system enables many more users to be able to share a printer than there are mailboxes, yet still have their jobs put into separate mailboxes, by automatically reassigning mailboxes, whenever they are free, to current printer users. As also taught here, the number of available mailboxes, and/or the ratio of locked to unlocked mailboxes and/or stacking trays, may be readily field retrofitably expanded or changed, if desired. The stapler may also be a field retrofittable optional accessory.

Another user programmable option can be to select whether or not to have the printer generate the usual "banner" (cover) sheets for each print job for that user. These job banner sheets may remain desirable, for example, for common stacking of unstapled intermixed jobs, but not necessarily for jobs already segregated by users into separate mailboxes, especially if the jobs are being stapled, as provided in the above-described mailbox unit. Eliminating banner sheets saves paper and improves productivity. This banner sheet versus no banner sheet selection is also desirably an automatic system default selection which may be overridden. Likewise, a manual or automatic system default selection of an open common or general use tray in the initial paper path may be made when the user job selection information or printer controller signals that the job is being printed on paper wanting special handling, or more likely to jam in the mailbox bin selection paper path or compiler system, such as carbonless paper, transparencies or envelopes.

It will be appreciated that many additional user option selections, and instructions for such selections, and other user instructional information, may be provided and automatically displayed. For example, users may be instructed to remove all sheets in a mailbox bin, and/or to not manually insert covers or other insert sheets into a bin unless a "stop print", pause, bin reassignment, or insert mode instruction is entered, to avoid a jam if further sheets are to be fed into that bin.

The control algorithm preferably always selects and fills first those available mailbox bins that are closest to the top of the mailbox bin array, since these higher bins are normally the easiest to unload. This is another advantage of this dynamic bin assignment system; all users can normally have an even chance to have an "upper" bin most of the time, except when there is heavy usage and many unremoved print jobs. However, a wheel chair bound or other disadvantaged user may want to have the algorithm programmed for him or her to always be assigned the lowermost available bin(s).

Another optional feature, for job removal assistance, is disclosed here in Figs. 10-13. Unlocking and opening any bin privacy door 52 here also automatically, with a simple, low cost mechanism 120, lifts the exposed front edge of the output sets therein for easy operator removal. After the door 52 initially opens by a preset amount or angle, an integral conventional limited angle or stop hinge (Figs. 10 and 13) or connecting link (Figs. 12) also then begins to pivot up, with further door opening, an arm plate or flap 122 (which lifts up by a lesser total angle), from the tray bottom under that edge of the job set or sets in that bin. That allows the user to easily slide his or her hand under the job set to grasp and remove it from the bin as the bin door is fully opened.

As particularly shown in Fig. 10, this set lifter mechanism 120 also may serve to protectively cover, with lifter plate 122, when it is down, the usual bin or tray bottom 13 "cut outs" 13b for set removal assistance, which openings are not appropriate to have open in such a security or lockbox mailbox bin. [Also, bin hand insertion access to the bottom of the stacked sheets via such a cut-out 13b would be blocked by a closed bin privacy door on the next adjacent underlying privacy door anyway.] The set lifter 120 flap 122 enables the same bin trays (with cut-outs 13b) to be used for either secured (privacy door) and unsecured (open) bins, which is desirable for a "universal" or modular output device, especially to provide mixed functions and/or interchangeable output mailboxes.

As noted, two slightly different said stack lifting mechanisms are respectively shown in Figs. 10, 11 and 13, versus Fig. 12. In either case, the arm or flap 122 lifts up the front edge of the stack when that bin door is opened. As shown, little additional hardware is required. Sets are easily removed in this manner even from low vertical height (small) bins, even though the operator cannot reach under the bin via cut-outs 13b where the underlying bin has a locked bin door. This set lifter system is particularly effective where the lateral or edge jogger of the compiler aligns the job sets towards the front or bin door side of the bin, and/or where the printer and/or mailbox is an edge registered rather than center registered system.

After a suitable time delay for bin unloading after it is initiated, an audio beeper (and a visual instructional display on the LCD display 104 or the like) is also desirably provided to remind the user to reclose (and thus re-lock) the opened bin door(s), so that they can be reassigned to other users and reused. If the bins are not cleared and/or the bins doors are not so closed after a suitable time delay, another such audio/visual indication can desirably be provided for that.

Another desired system feature is that the controller 100 displays (and may also indicate to the system, e.g., the printer U.I.) from the mailbox memory, jobs printed more than 24 hours earlier and not yet removed from their bins. The systems administrator and/or key operator may be prompted by messages to remove those old jobs from mailboxes. He or she may be provided codes giving access to any or all bins for that, or other, purposes.

Exemplary embodiments above include details of providing both locked and unlocked (regular) mailbox bins, and providing for automatic electronic unlocking of selected mailbox bins with locked access or "privacy" bin doors for particular users by "keying in" users' access codes. Other embodiments above indicate that "Workstations on the network with conversion software can interact with the print service," and "The user can see the status of a print job and its place in the queue by making a request through the print server terminal or at the workstation". "The system can also automatically generate a network message back to the job senders terminal, if desired, as soon as a print job is completed and in a bin, so that the users screen displays a status message like 'your job is in bin #3'; or 'the printer is out of paper'; or the like. Or, as noted below, voice-mail may be used for this." As further stated above "as further discussed hereinbelow, it will be appreciated that in a modern system or networked office environment, various of the control and software functions described herein may be done in the system printer server rather than in the mailbox unit or the printer unit per se."

The subject exemplary embodiment disclosed features of an electronic printer and multibin mailbox system for an electronically networked system of plural users of an electronic printer, in which printer mailbox system the individual users print jobs of printer sheets printed by said printer are automatically variably directed into particular electronically assigned print job storage mailbox bins of said multibin mailbox system, at least some of which mailbox bins are nominally locked but electronically unlockable mailbox bins providing restricted public access privacy storage of confidential print jobs, further including an electronic access code inputting system for individual said users to respectively input a respective access code for unlocking their said electronically assigned electronically unlockable user mailbox bins, and a control system for reporting to said individual said user which said locked mailbox bins are occupied by

print jobs, said control system also monitoring and electronically providing a job removal prompting indicator display signal when said uses leave their print jobs unremoved from said mailbox bins for took long a time, exceeding a preset time period; and/or the electronic printer and multibin mailbox system wherein said control system automatically provides a prompting message instructing an operator to remove all print jobs printer more than 24 hours earlier and not yet removed from said mailbox bins, and/or the electronic printer and multibin mailbox system wherein said individual users print jobs may alternatively be selectably fed into one or more open unconfidential said job storage bins rather than into selected ones of said locked and electronically unlockable mailbox bins; and/or the electronic printer and multibin mailbox system wherein said control system automatically provides electronic instructions to a systems administrator who is also provided with an access code to open any of said electronically unlockable mailbox bins to remove said unremoved jobs from said locked mailboxes, and/or the electronic printer and multibin mailbox system wherein said control system for reporting which said locked mailbox bins are occupied by print jobs to said individual said user includes bin empty sensors for individual said bins to indicate which said bins are empty or contain print jobs therein.

Reference is now made to a typical office information system 210 illustrated in Fig. 22, the office system including an electronically networked system allowing a plurality of users to share the same printer 222. System 210 includes an Ethernet local area network (LAN) 212, to which a number of user workstations 214, including workstations 214A and 214B, are connected. Workstations 214 may be, for example, the Xerox 6085 professional workstation. LAN 212 may also have other office-connected equipment, such as network file server 216, network file/mail/communication server 218, printer server 220 and printer 222. Also, a large capacity remote storage facility, such as a UNIX mini computer 224, may be connected to LAN 212. System 210 is a collaborative type system, meaning that it enables users at different workstations 214 to work together in real-time by processing and passing information along one another and storing and retrieving information from storage services 216 and 224 via network 212. The collaborative functions of system 210 could also be centralised in a single main CPU, could be distributed among processors at the workstations, or could be provided in any combination of centralisation and distribution. Similarly, LAN 212 could take any appropriate configuration capable of providing the necessary communication to support collaboration.

System 210 includes display-based user interfaces, with each workstation 214 including a display device and a user input device. In this connection, workstations 214A and 214B illustratively include respective CRT display screens 226 and 228 and keyboards 225, each with a display cursor mouse 230. System 210 includes an object oriented display system that comprises iconic representations of different structured data objects positioned on a workspace of a display screen, e.g., a display illustrating an office desktop metaphor employing various abstractions of a typical office environment, representative of real office objects. Examples of these abstractions in Fig. 1 are a desktop 232, inbasket 233, outbasket 234, documents 235 and 235A, file folder 236, file drawer 237 and printer 238. Document icon 235A is shown "opened", in that an <OPEN> command has been invoked and opened window 235B has appeared displaying the document in full scale. Printer 238 is an iconic representation of the shared printer 222 on LAN 212. A document 235 is able to be moved, via a <COPY> command from keyboard 225, onto printer icon 238 and will be printed at printer 222. Electronic mail is received and sent via a workstation inbasket 233 and outbasket 234, respectively, from and to other workstations on LAN 212 or to workstations on other networks via File/Mail/Com server 218.

The desktop 232 of workstations 214A and 214B also includes a shared structured data object 240, which is shown in larger details between workstations 214 and 214B. This shared structured data object corresponds to a container of related structured data objects, and the data content of the related structured data objects enables users at different workstations to work together in real time. The contained bodies of related structured data objects need not be mutually exclusive.

While the embodiment disclosed herein is preferred, it will be appreciated from this teaching that various alternatives, modifications, variations or improvements therein may be made by those skilled in the art, which are intended to be encompassed by the following claims:

Claims

1. A mailboxing system for feeding sheets from an output device into selected mailbox bins (11) associated with respective users of the output device, characterised by bin selector means (90) for selectably collecting one or more job sets in a selected mailbox bin whilst also providing for stacking of a limited number of subsequent job sets from the same user on top of the prior job sets in the same selected mailbox bin (11), control means (100) responsive to repeated determinations of which mailbox bins (11) are currently available for stacking job sets therein for controlling said bin selector means (90) to select which of said mailbox bins (11) is to be assigned to par-

ticular users and indicating means for identifying which mailbox bin (11) contains job sets for a particular user thereby allowing multiple users to share the output device and the mailing system even if the number of shared users exceeds the number of mailbox bins (11).

2. A mailboxing system for selectively collecting the sheets outputted by a shared users output device in an arrayed plurality of mailbox bins (11) of a limited sheet capacity per bin, for collecting such output sheets therein in collated printer job sets of stacked plural said output sheets per job, and with sheet feeding means for sequentially feeding said output sheets from said output device to said mailbox bins so as to be segregated by bins by respective users of said shared user output device, characterised in that the mailbox bins are not permanently assigned to particular users, and are variably assigned, comprising;

a variable bin selector (90) for selectably collecting plural said collated job sets of said output sheets in a selected bin of said array of mailbox bins,

said variable bin selector (90) providing for stacking a limited number of subsequent job sets from the same output device user on top of prior job sets in the same said selected mailbox bin,

an electronic controller (100) for controlling said variable bin selector (90) for repeatedly variably selecting which ones of said plurality of mailbox bins will be temporarily assigned to particular said shared output device users,

said controller (100) collecting information as to which said mailbox bins (11) have had job sets of another user stacked therein which have not yet been removed, in order to variably select other ones of said mailbox bins to be temporarily assigned to a particular said user,

said controller (100) selecting which ones of said bins (11) will be assigned to a particular user in response to repeated determinations of which said mailbox bins (11) are currently so available for stacking job sets therein, and controlling said variable bin selector means (90) to collect said job sets of output sheets for that particular user in those selected bins (11),

and a variable user indicator system repeatedly updated by said controller (100) for identifying to said users which of said variably assigned mailbox bins (11) contain job sets for a particular user wishing to remove job sets from said mailboxing system,

thereby allowing multiple users to share said output device and said mailboxing system therefor even if the number of said shared users exceeds the number of said plural mailbox bins.

3. A mailboxing system as claimed in claim 1 or claim 2, wherein said controller (100) further determines if the job sets being printed for a particular user will exceed said limited output sheet capacity of said selected bin for said user, and controlling said variable bin selector (90) to select an additional available bin to be temporarily assigned to that particular user, and directing further said job sets for that particular user to said additional available bin, and for additionally storing the information that said additional mailbox bin also has additional job sets stacked therein for said particular user.

4. A mailboxing system as claimed in any one of claims 1 to 3, wherein said plural mailbox bins are in a stationary array, and wherein said variable bin selector includes an output sheet compiling unit (90) variably movable relative to said mailbox bins array.

5. A mailboxing system as claimed in any one of claims 1 to 4, further including a variable user display for indicating which of said mailbox bins contain output sheets for a particular said user in response to entry of a respective distinguishable access code for each user.

6. A mailboxing system as claimed in any one of claims 1 to 5, wherein at least some of said mailbox bins have access restricting privacy doors with locks, which are electronically unlockable by user access codes.

7. A mailboxing system as claimed in any one of claims 1 to 6, wherein said output device is a printer, said printer and said mailboxing system therefor for being shared by plural users each having distinguishable user codes, said printer has a print server, and said controller is electronically connected to said print server to receive said user codes as identification of job sets being fed to said mailboxing system from said printer and job sheet count information.

8. A mailboxing system as claimed in any one of claims 1 to 7, wherein said electronic controller (100) variably controls said variable bin selection for said selection of which print jobs are directed to which bins depending on which bins are not full and not previously used for another unremoved user job at the time of said selection, and wherein said electronic controller (100) electronically stores said variable bin assignment information as to which said bins contain print jobs for particular user codes, which said variable bin assignment information is displayed on command by a user bin identification display.

9. A mailboxing system as claimed in any one of claims 1 to 8, wherein said electronic controller (100) variably controls said variable bin selection to continue to direct print jobs having the same user code into the same single first bin if it will not overfill that first bin, and into the next closest empty bin if it will overfill said first bin, to provide a virtual bin not limited to the sheet capacity of any one bin.

10. A mailboxing system as claimed in any one of claims 1 to 9, wherein said controller bin information comprises both the number of document pages in the user job and the number of copies of the user job being printed.

11. A variable mailboxing system as claimed in any one of claims 1 to 10, wherein said bins are not designated for any particular user of said shared user printer in advance of the control of said printer for print jobs for said particular user unless a previous print job for that same user has been placed in a said bin and not removed; and/or wherein said bins are not so selected for any particular user of said shared user printer in advance of feeding a print job from said printer to said mailbox system for said particular user unless a previous print job for that same user has already been placed in a said mailbox bin and not removed.

12. A mailboxing system as claimed in claim 1 or claim 2, wherein the output device is a printer and said mailboxing system comprises a mailbox module, and wherein said mailboxing system is shared by plural users each having distinguishable access codes, and further including a variable user display for indicating which of said mailbox bins contain output sheets for a particular said user in response to entry of a said distinguishable access code, and wherein said controller bin information comprises both the number of document pages in the user job and the number of copies of the user job being printed, and wherein said bins are not designated for any particular user of said shared user printer in advance of the control of said printer for print jobs for said particular user unless a previous print job for that same user has been placed in a said bin and not removed, and wherein said electronic controller further determines if the job sets being printed for a particular user will exceed said limited output sheet capacity of said selected bin for said user, and controls said variable bin selector to select an additional available bin to be temporarily assigned to that particular user, and directs further said job sets for that particular user to said additional available bin, and additionally stores the information that said additional mailbox bin also has additional job sets stacked therein for said particular user, and wherein said electronic controller variably controls said variable bin selection for said selection of which print jobs are directed to which bins depending on which bins are not full and not previously used for another unremoved user job at the time of said selection, and wherein said electronic controller variably controls said variable bin selection to continue to direct print jobs having the same user code into the same single first bin if it will not overfill that first bin, and into the next closest empty bin if it will overfill said first bin, to provide a virtual bin not limited to the sheet capacity of any one bin, and wherein said electronic controller electronically stores said variable bin assignment information as to which said bins contain print jobs for particular user codes, which said variable bin assignment information is displayed on command by a user bin identification display.

13. A printer mailboxing system for segregating the output of sequential sheet print jobs of various users of a shared user printer, said printer having a print server in which print jobs for particular users may be electronically identified by users and in which print server job sheet count information for specific jobs may be queued, characterised by

a multi-bin mailbox module (10) adapted to receive the sequential printed sheets output of print jobs of said printer,

said mailbox module (10) having a sheet distributor system for distributing and stacking plural said print jobs of sequential printed sheets into variable selected said bins (11) of said multi-bin mailbox module (10),

said mailbox module (10) having an electronic controller (100) for controlling said sheet distributor system for said variable selection of said mailbox bins (11) into which particular print jobs of said sequential printed sheets are to directed, and for electronically storing information as to which said mailbox bins said particular print jobs have been directed, for which said shared users, and which said mailbox bins (11) have been emptied;

said mailbox module controller (100) being electronically connected to said shared user print server to receive said user information and said job sheet count information, and to variably so select which said mailbox bins will be used for storing said print jobs therein based on said electronically stored information in said electronic controller;

and a user bin identification display electronically connecting with said electronic control-

ler (100) for indicating to said shared users upon an electronic query which bins of said multi-bin mailbox contain print jobs for a particular said shared users at the time of said query.

14. A printer mailboxing system as claimed in claim 13, wherein said user bin identification display includes a visual display on said mailbox module itself.

15. A mailboxing system as claimed in claim 1, including locking means (50, 54) operable by said control means (100) for restricting access to sheets stacked in the selected mailbox bin and release means operable to release the locking means for providing access to the stacked sheets in the selected bin.

16. A mailboxing system as claimed in claim 15, wherein the release means is operable to release the locking means (50,54) for the selected mailbox bin (11) while one or more or all of the remainder of the mailbox bins remain locked.

17. A mailboxing system as claimed in claim 15 or 16, wherein the mailbox bins are disposed in a housing and at least some are slidably supported therein, the locking means serving to lock the mailbox bins in the housing to prevent sliding movement and the release means serving to unlock the mailbox bins to permit sliding movement and to allow at least partial removal of the mailbox bins from the housing.

18. A mailboxing system as claimed in any one of claims 15 to 16, wherein the sheet feeding means includes a plurality of diverter gates (32), each diverter gate (32) being associated with a respective mailbox bin (11), each diverter gate (32) being individually movable from a first position, permitting sheets to travel past its associated bin, to a second position for directing the sheets into its associated bin, and including actuator means (35) for selectively moving one of the diverter gates (32) to the second position.

19. A mailboxing system as claimed in any one of claims 15 to 18, wherein at least some of the mailbox bins are spring-loaded so as to automatically slide out like drawers from the housing when released by a latching mechanism.

20. A mailboxing system as claimed in claim 19, wherein the latching mechanism is operably released by electromagnetic means.

21. A mailboxing system as claimed in any one of claims 15 to 20, wherein the sheet feeding means includes sheet treatment means in the input sheet path upstream of the bins for allowing a choice of side-ways or end-wise sheet bin stacking, and/or selection of the side of a set of sheets to be stapled.

22. A mailboxing system as claimed in any one of claims 15 to 21, wherein the sheet feeding means includes sheet inverter means for inverting sheets prior to entering the mailbox.

23. A mailboxing system as claimed in any one of claims 15 to 22, wherein the mailbox bins are electronically unlockable by user access codes.

24. A mailboxing system as claimed in any one of claims 15 to 23, wherein the control means (100) variably controls the bin selection to continue to direct sheets for a job or jobs having a same user code into the same first bin if the job or jobs will not overfill that bin, and into an overfill bin if the job or jobs will overfill the first bin.

25. A mailboxing system as claimed in any one of claims 15 to 24, wherein notification means is provided for alerting a user to unload the sheets of a job or jobs from a bin.

26. A mailboxing system as claimed in any one of claims 15 to 25, wherein a user interface is provided whereby a user can gain access to the sheets in their selected bin by entering their user code into the user interface.

27. A mailboxing system as claimed in claim 26, wherein the user interface includes a keypad into which the user enters their user code.

28. A mailboxing system as claimed in any one of claims 15 to 27, wherein notification means is provided for providing a removal instruction when a job has been left in a mailbox bin beyond a preset period.

29. A mailboxing system as claimed in any one of claims 15 to 28, wherein a user bin indicator means is provided, the indicator means being repeatedly updated by the control means for identifying to the users which of the mailbox bins contain job sets for a particular user.

30. A mailboxing system as claimed in claim 29, wherein the user bin indicator means comprises display means activated by entry of an access code into a user code entry device for the control means.

31. A mailboxing system as claimed in any one of

claims 15 to 30, wherein the output device is a printer.

32. A mailboxing system as claimed in any one of claims 15 to 31, wherein said control means (100) selects which ones of said bins will be assigned to a particular user in response to repeated determinations of which mailboxes are currently available for stacking job sets therein, a bin being currently available for another user only if it is empty or has been emptied out in the meantime by a prior user, but is currently available for the same user previously assigned that bin even if not empty as long as that bin is not going to overfill on the next job set being printed.

33. A system as claimed in claim 1, said mailbox system including a sheet input path at said output of said shared users output device to sequentially receive said output job sheets therefrom, plural discrete job output sheet collection bins providing user mailboxes, the control system for electronically assigning discrete bin numbers to respective said output sheet collection bins, and for electronically assigning said discrete bin numbers to different said users of said shared users job output device, a sheet bin selection and feeding system controlled by said control system for selectively feeding said job sheets from said sheet input path to designated output sheet collection bins corresponding to said electronically assigned bin numbers for said designated users, said output sorting mailbox system also having a bin locking system for restricting access to a plurality of individual said output sheet collection user mailbox bins thereof, including an electrical bin unlocking system operatively connecting with said control system for automatically unlocking discrete said bins in response to user entries of discrete bin unlocking access codes assigned to discrete users of said output sorting mailbox system.

34. A system as claimed in claim 33 wherein the output job sorting mailbox is a modular unit with an electronic keypad connecting with said control system on which said bin access codes are user enterable.

35. A sorter for feeding sheets from an output device into a mailbox bin, characterised in that the sorter incorporates a system as claimed in any one of claims 1 to 34.

36. A sorter as claimed in any one of claims 1 to 35, said sorter being for use with a sheet printing machine comprising a housing, a plurality of sorter trays disposed in said housing in longitudinally extending vertically spaced relation, sheet feeding means for directing sheets to said trays to form sets of sheets, said trays being in the form of drawers slidably supported in said housing to be partially removed from said housing, means normally locking said drawers in said housing against sliding movement, and means selectively operable to release the locking means for one of said drawers while the rest of said drawers remain locked by said locking means.

37. A sorter as claimed in claim 36, wherein said sheet feeding means includes a deflector at each tray normally permitting travel of a sheet past the trays, each said deflector being individually shiftable to a position to direct a sheet into a selected tray, and including actuator means for selectively shifting one of said deflectors to said said position directing a sheet to a tray.

38. A sorter as claimed in claim 37, wherein the sorter incorporates a system as claimed in any one of claims 1 to 34.

39. An electronic printer and multibox system for an electronically networked system of plural users of an electronic printer, the system being as claimed in claim 1 and

in which printer mailbox system the individual users print jobs of printed sheets printed by said printer are automatically variably directed into particular electronically assigned print job storage mailbox bins of said multibox system,

at least some of which mailbox bins are nominally locked but electronically unlockable mailbox bins providing restricted public access privacy storage of confidential print jobs,

further including an electronic access code inputting system for individual said users to respectively input a respective access code for unlocking their said electronically unlockable user mailbox bins,

and a control system for reporting to said individual said user which said locked mailbox bins are occupied by print jobs,

said control system also monitoring and electronically providing a job removal prompting indicator display signal when said users leave their print jobs unremoved from said mailbox bins too long a time, exceeding a preset time period.

40. An electronic printer and multibin mailbox system as claimed in claim 39, wherein said control system automatically provides a prompting message instructing an operator to remove all print jobs printed more that 24 hours earlier and not yet removed from said mailbox bins.

41. An electronic printer and multibin mailbox system as claimed in claim 39 or claim 40, wherein said individual users print jobs may alternatively be selectably fed into one or more open unconfidential said job storage bins rather than into selected ones of said locked and electronically unlockable mailbox bins.

42. An electronic printer and multibin mailbox system as claimed in any one of claims 39 to 41, wherein said control system automatically provides electronic instructions to a systems administrator who is also provided with an access code to open any of said electronically unlockable mailbox bins to remove said unremoved jobs from said locked mailboxes.

43. An electronic printer and multibin mailbox system as claimed in any one of claims 39 to 42, wherein said control system reports for reporting said locked mailbox bins are occupied by print jobs to said individual said user includes bin empty sensors for individual said bins to indicate which said bins are empty or contain print jobs therein.

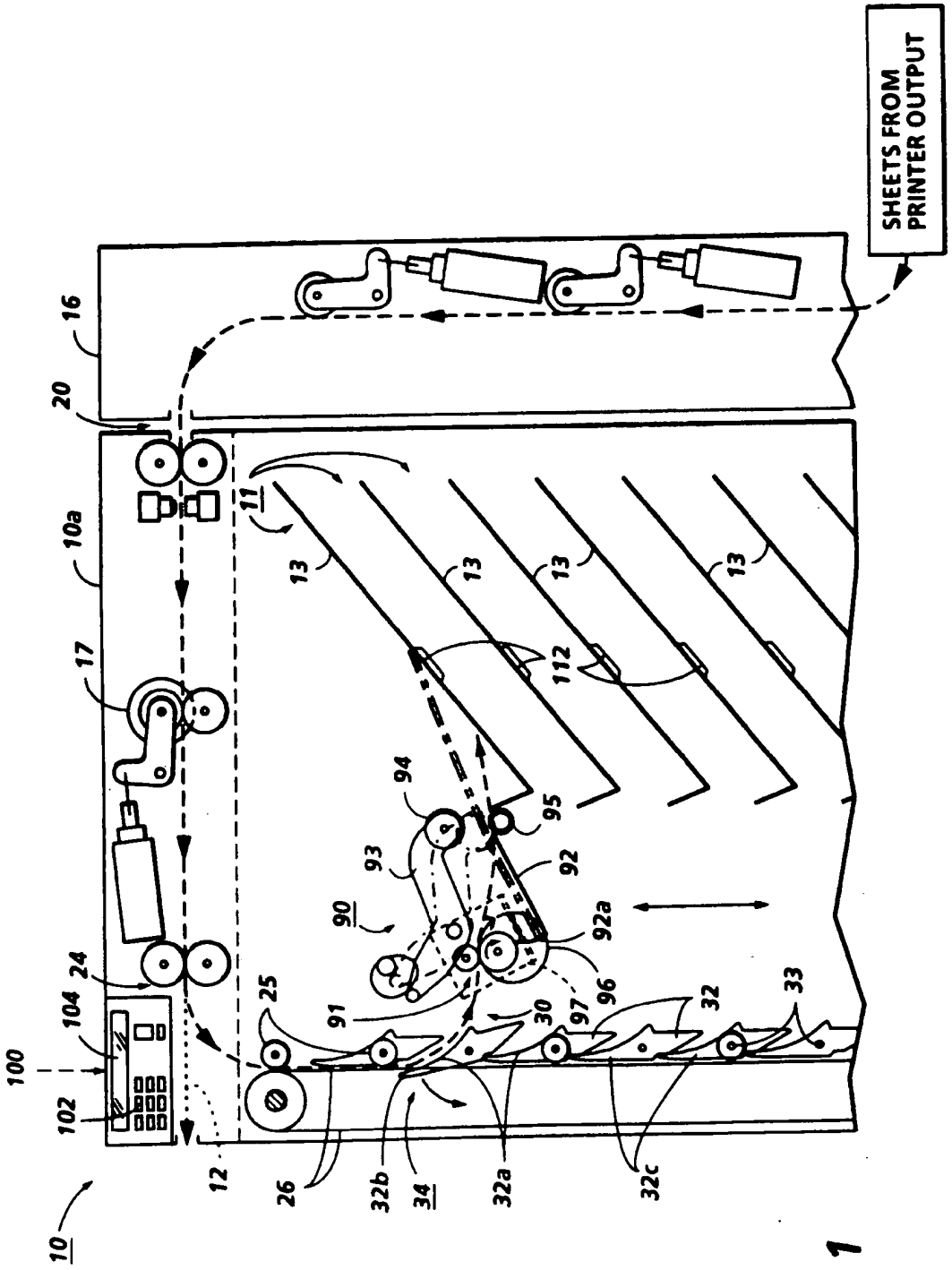

SHEETS FROM PRINTER OUTPUT
16
20
10a
17
24
104
100
102
10
12
11
13
112
94
95
93
92
90
92a
96
91
25
30
97
32
33
26
32b
34
32a
32c

FIG. 1

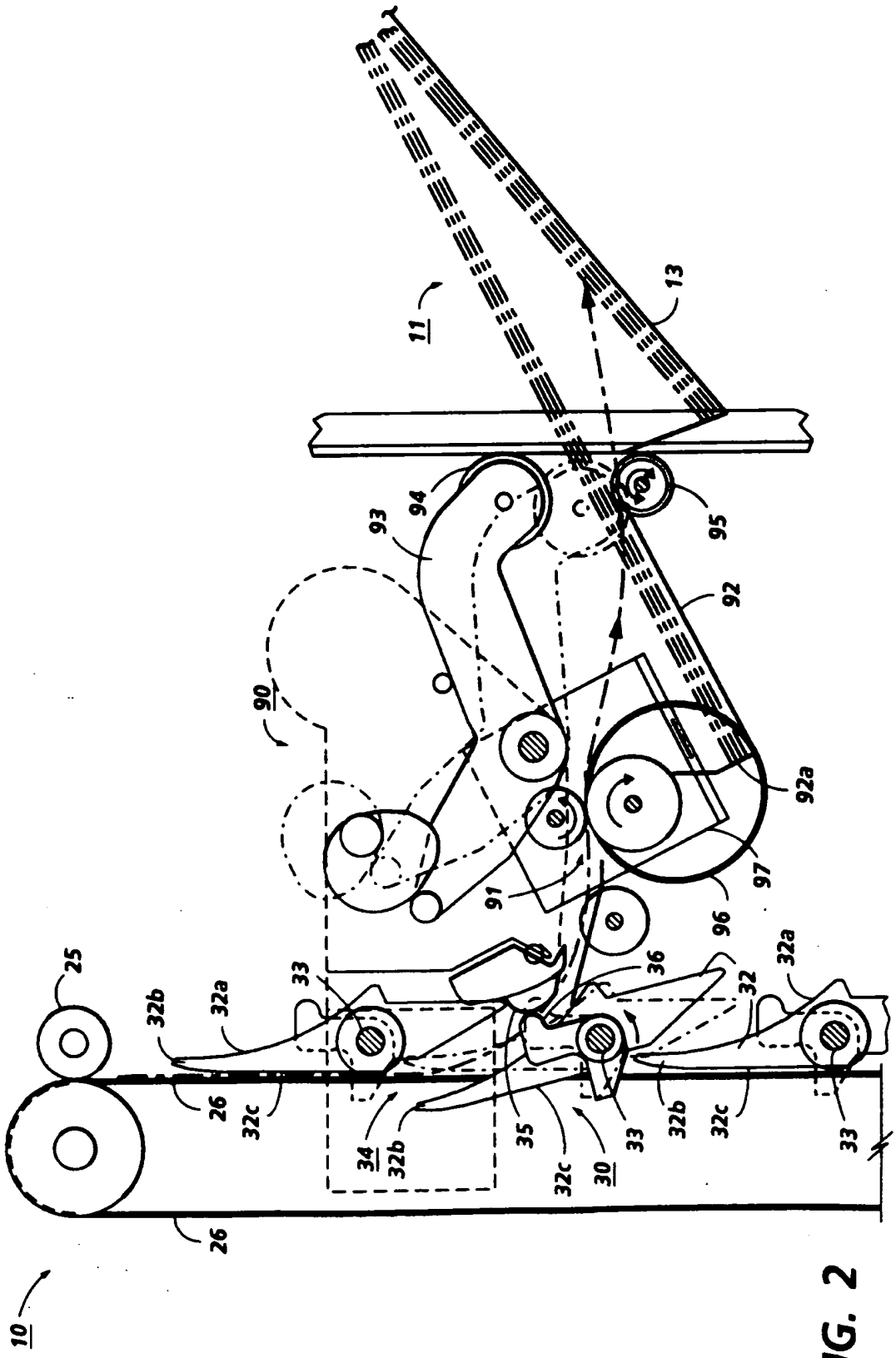


FIG. 2

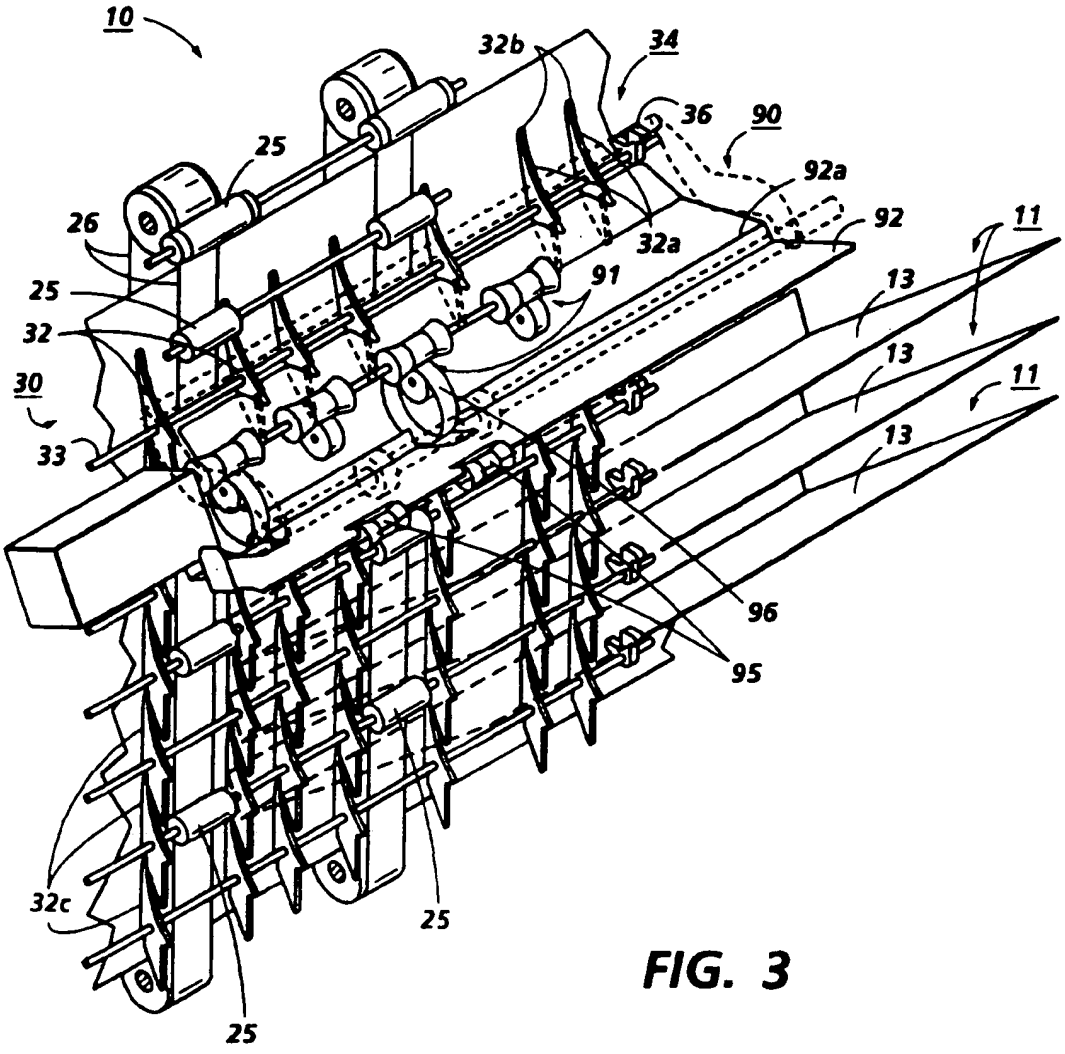

10
32b
34
36
90
25
92a
26
92
11
32a
25
91
13
32
13
30
11
33
13
96
95
32c
25
25

FIG. 3

FIG. 4A

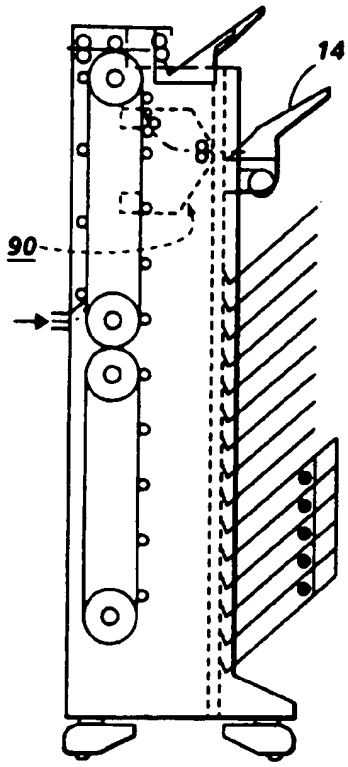


FIG. 4B

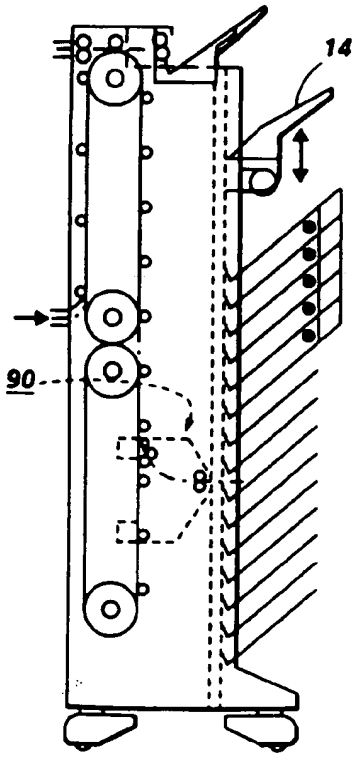


FIG. 4C

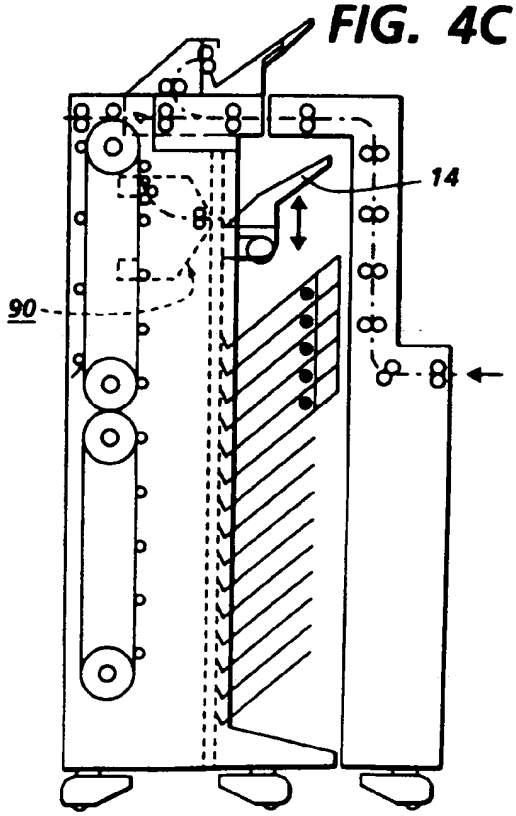
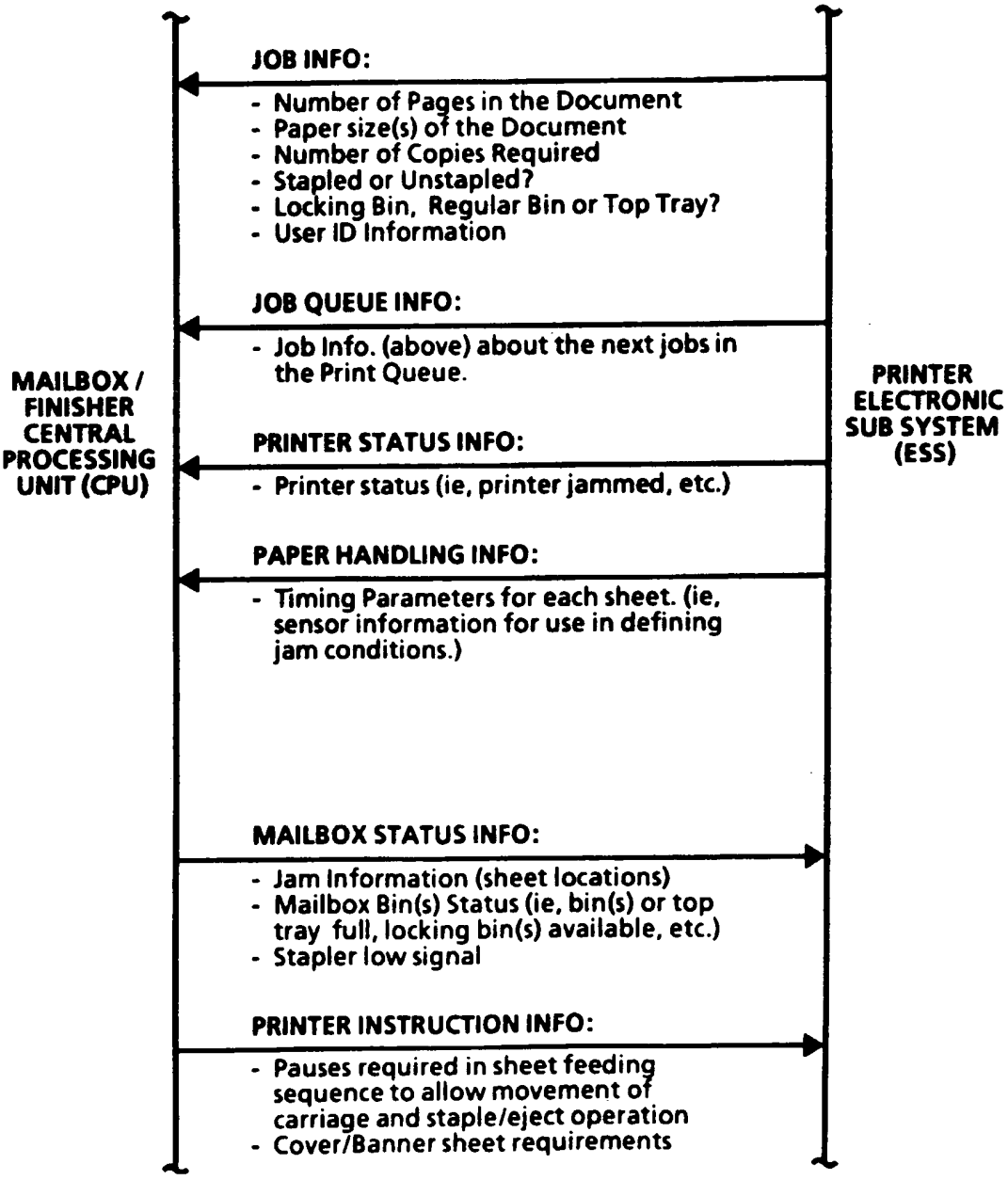


FIG. 5


MAILBOX / FINISHER CENTRAL PROCESSING UNIT (CPU)
PRINTER ELECTRONIC SUB SYSTEM (ESS)
JOB INFO:
- Number of Pages in the Document
- Paper size(s) of the Document
- Number of Copies Required
- Stapled or Unstapled?
- Locking Bin, Regular Bin or Top Tray?
- User ID Information
JOB QUEUE INFO:
- Job Info. (above) about the next jobs in the Print Queue.
PRINTER STATUS INFO:
- Printer status (ie, printer jammed, etc.)
PAPER HANDLING INFO:
- Timing Parameters for each sheet. (ie, sensor information for use in defining jam conditions.)
MAILBOX STATUS INFO:
- Jam Information (sheet locations)
- Mailbox Bin(s) Status (ie, bin(s) or top tray full, locking bin(s) available, etc.)
- Stapler low signal
PRINTER INSTRUCTION INFO:
- Pauses required in sheet feeding sequence to allow movement of carriage and staple/eject operation
- Cover/Banner sheet requirements

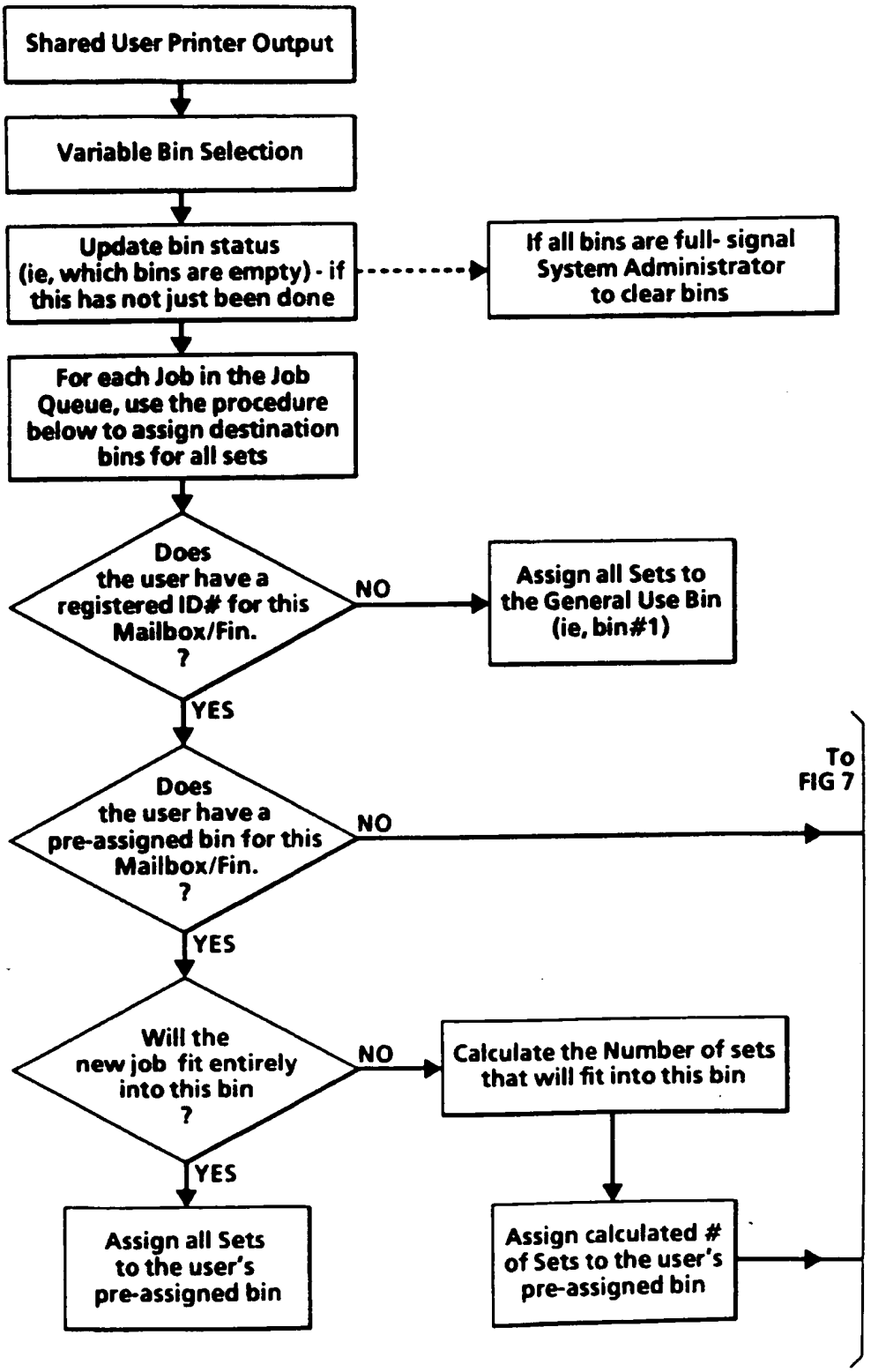
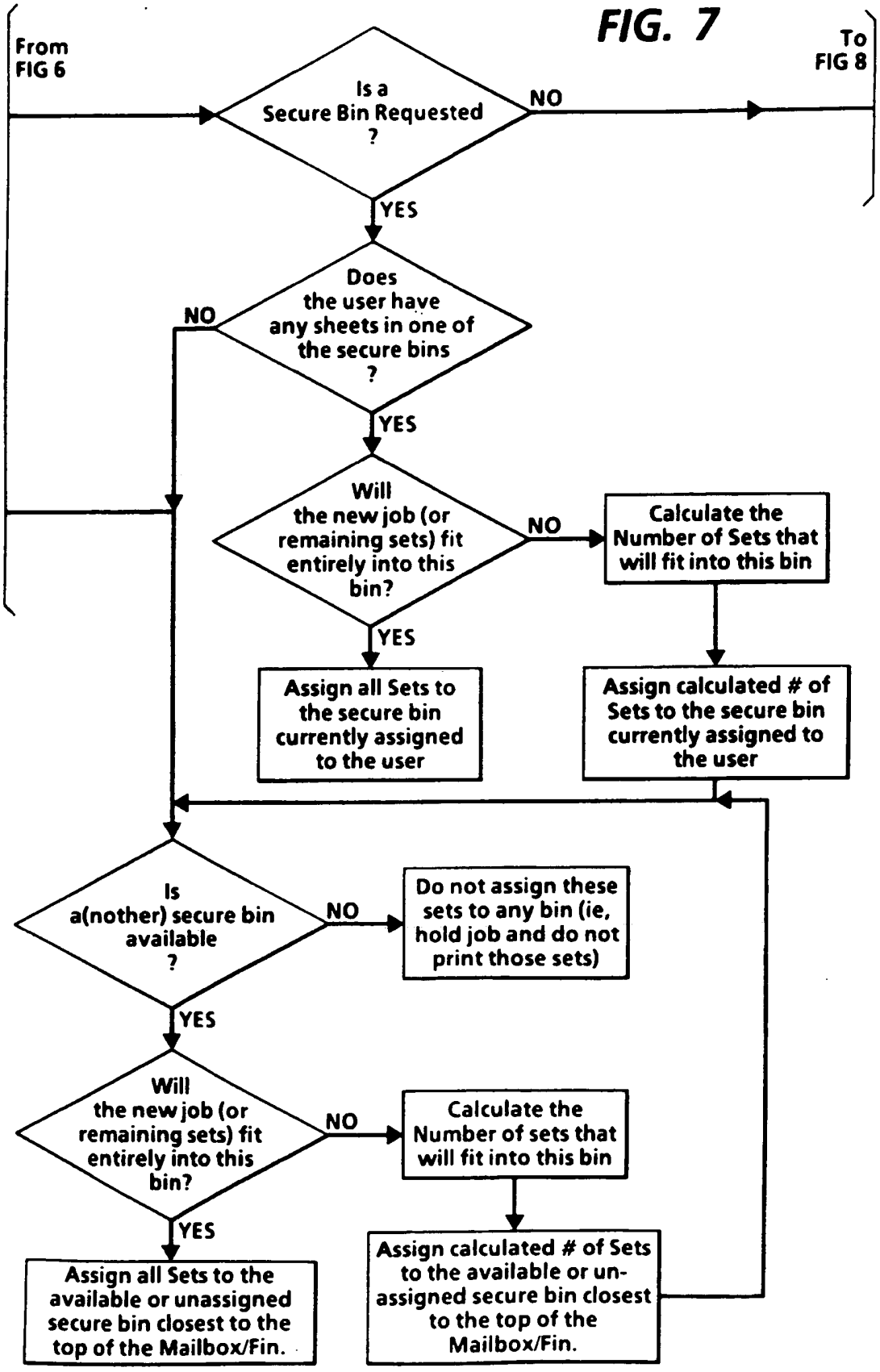

Shared User Printer Output
Variable Bin Selection
Update bin status (ie, which bins are empty) - if this has not just been done
If all bins are full- signal System Administrator to clear bins
For each Job in the Job Queue, use the procedure below to assign destination bins for all sets
Does the user have a registered ID# for this Mailbox/Fin. ?
NO
Assign all Sets to the General Use Bin (ie, bin#1)
YES
Does the user have a pre-assigned bin for this Mailbox/Fin. ?
NO
To FIG 7
YES
Will the new job fit entirely into this bin ?
NO
Calculate the Number of sets that will fit into this bin
YES
Assign all Sets to the user's pre-assigned bin
Assign calculated # of Sets to the user's pre-assigned bin

FIG. 6

FIG. 7


From FIG 6
Is a Secure Bin Requested ?
NO
To FIG 8
YES
Does the user have any sheets in one of the secure bins ?
NO
YES
Will the new job (or remaining sets) fit entirely into this bin?
NO
Calculate the Number of Sets that will fit into this bin
YES
Assign all Sets to the secure bin currently assigned to the user
Assign calculated # of Sets to the secure bin currently assigned to the user
Is a(nother) secure bin available ?
NO
Do not assign these sets to any bin (ie, hold job and do not print those sets)
YES
Will the new job (or remaining sets) fit entirely into this bin?
NO
Calculate the Number of sets that will fit into this bin
YES
Assign all Sets to the available or unassigned secure bin closest to the top of the Mailbox/Fin.
Assign calculated # of Sets to the available or un-assigned secure bin closest to the top of the Mailbox/Fin.

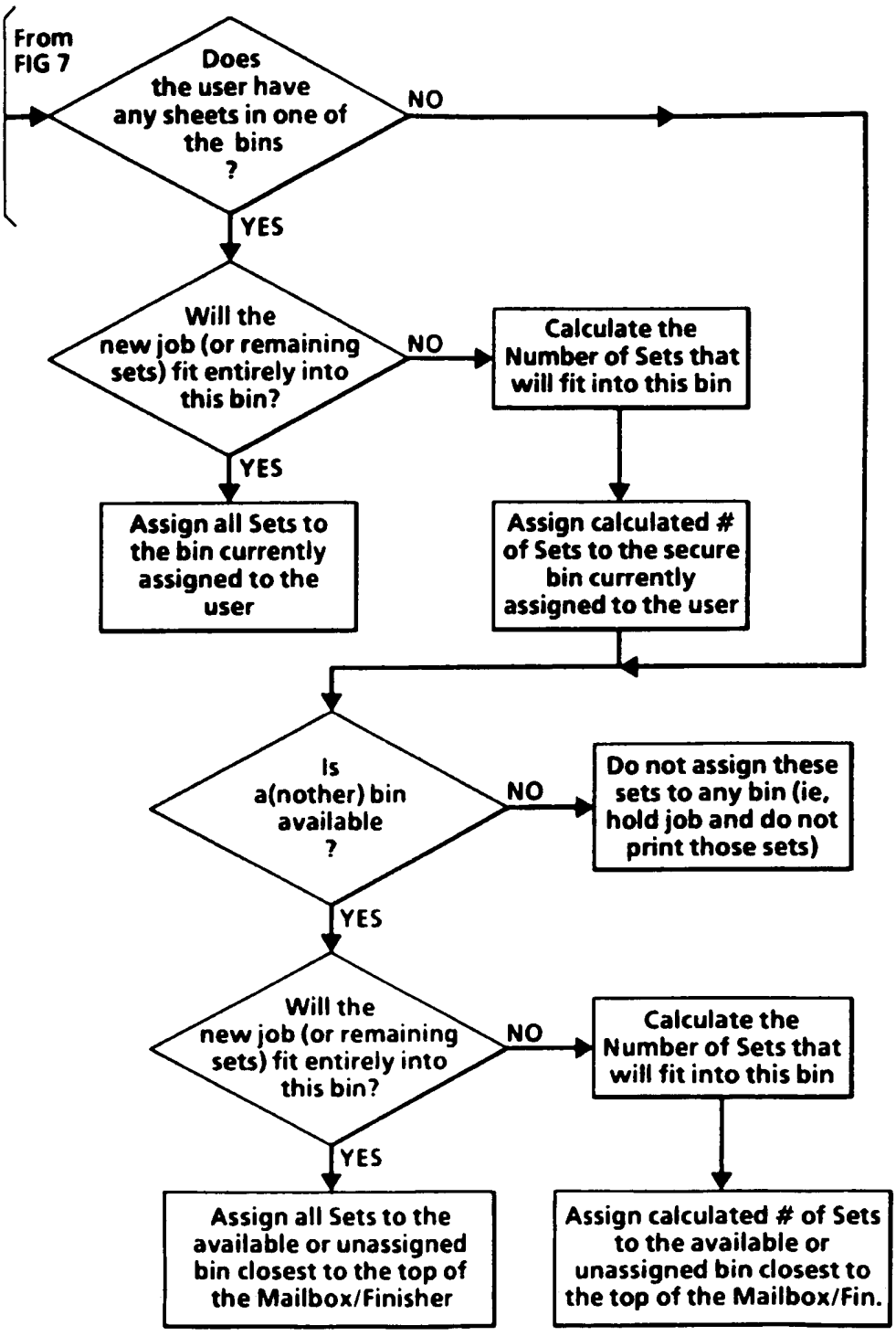

From FIG 7
Does the user have any sheets in one of the bins ?
NO
YES
Will the new job (or remaining sets) fit entirely into this bin?
NO
Calculate the Number of Sets that will fit into this bin
YES
Assign all Sets to the bin currently assigned to the user
Assign calculated # of Sets to the secure bin currently assigned to the user
Is a(nother) bin available ?
NO
Do not assign these sets to any bin (ie, hold job and do not print those sets)
YES
Will the new job (or remaining sets) fit entirely into this bin?
NO
Calculate the Number of Sets that will fit into this bin
YES
Assign all Sets to the available or unassigned bin closest to the top of the Mailbox/Finisher
Assign calculated # of Sets to the available or unassigned bin closest to the top of the Mailbox/Fin.

FIG. 8

FIG. 9A

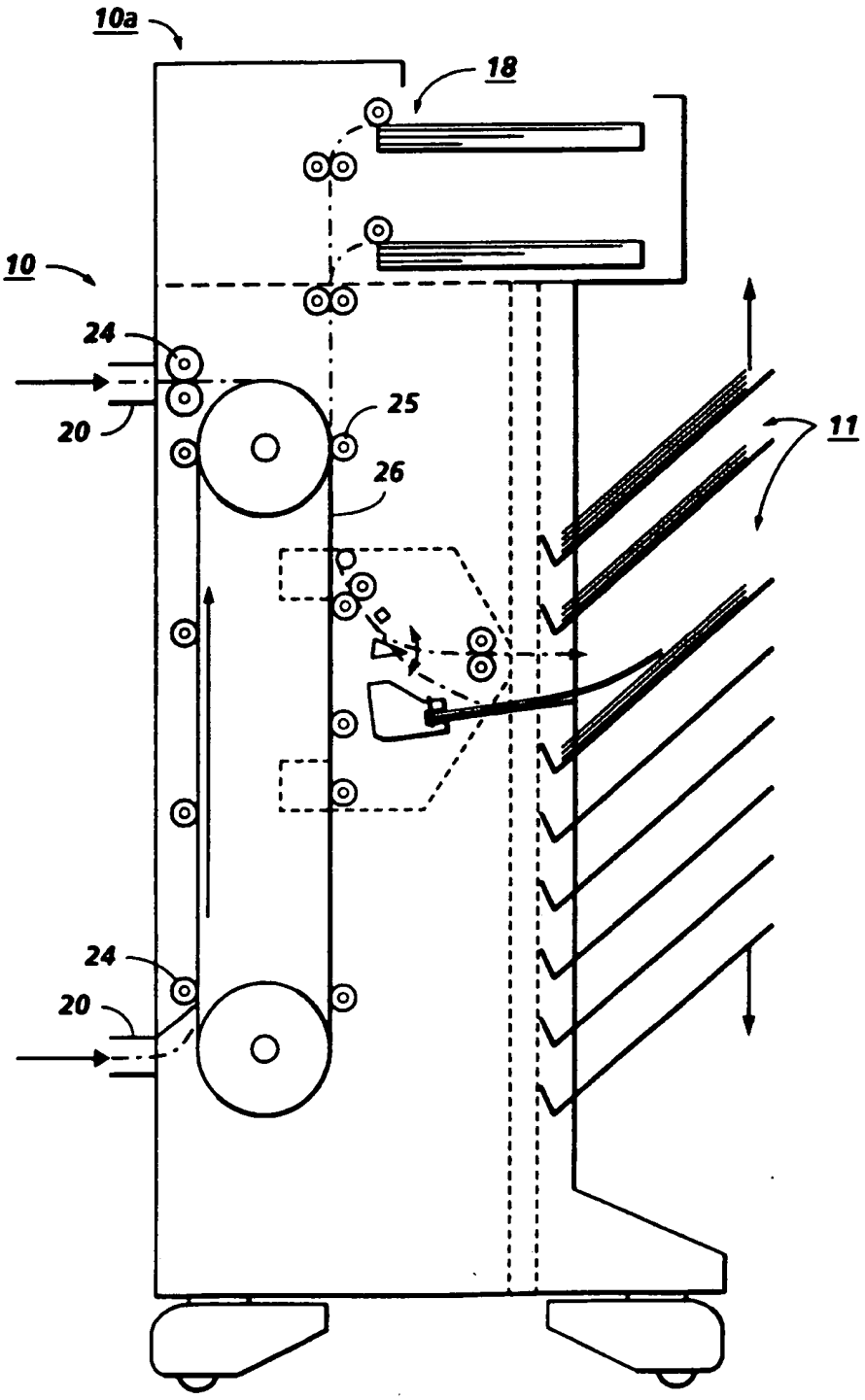


FIG. 9B

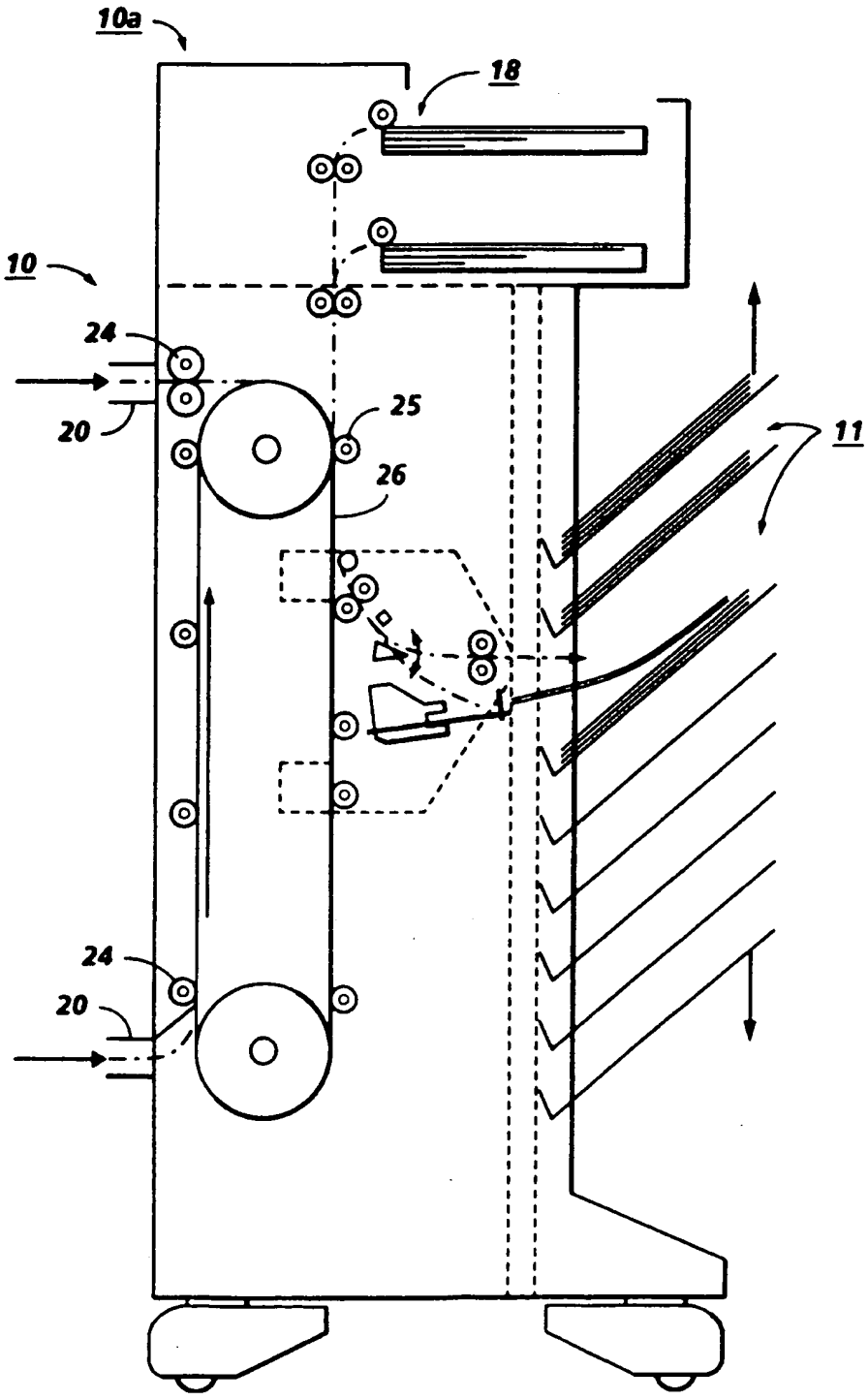


FIG. 10

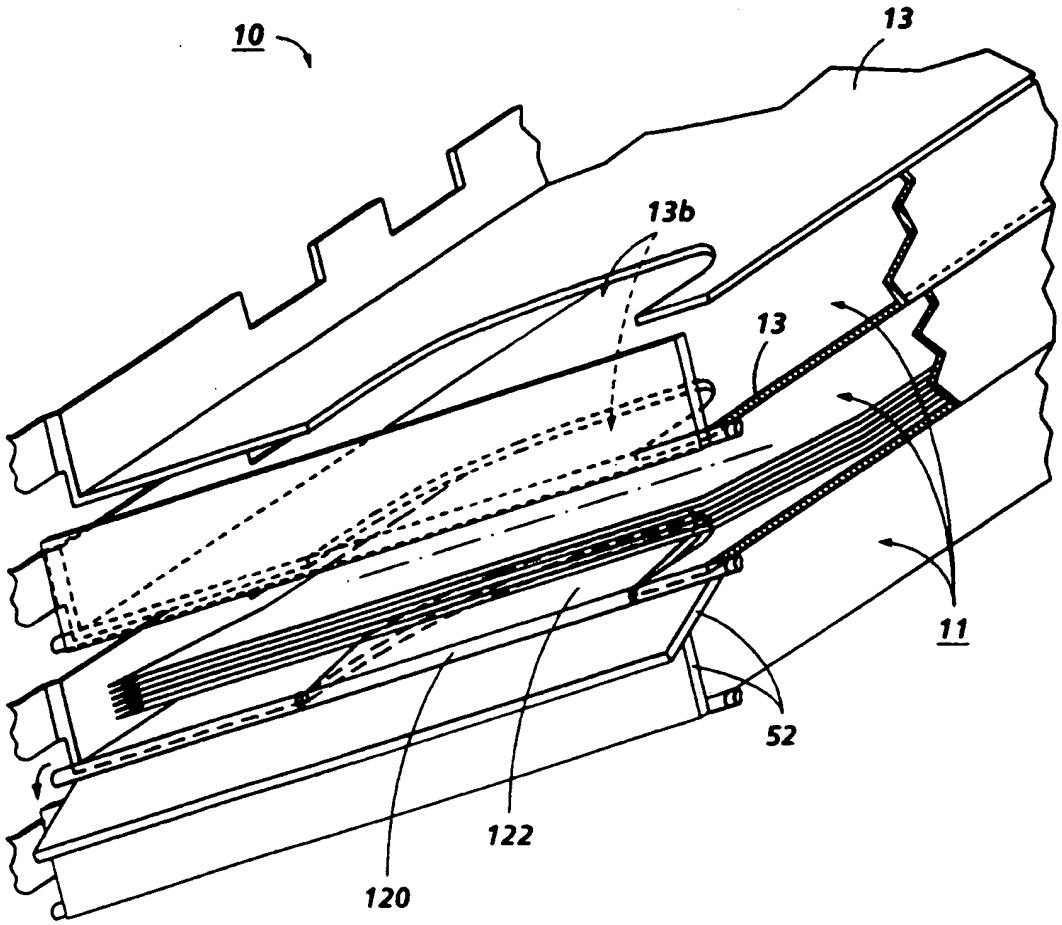


FIG. 11A

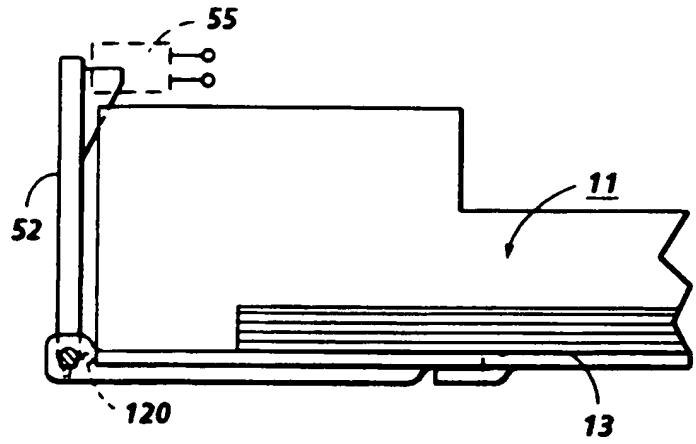


FIG. 11B

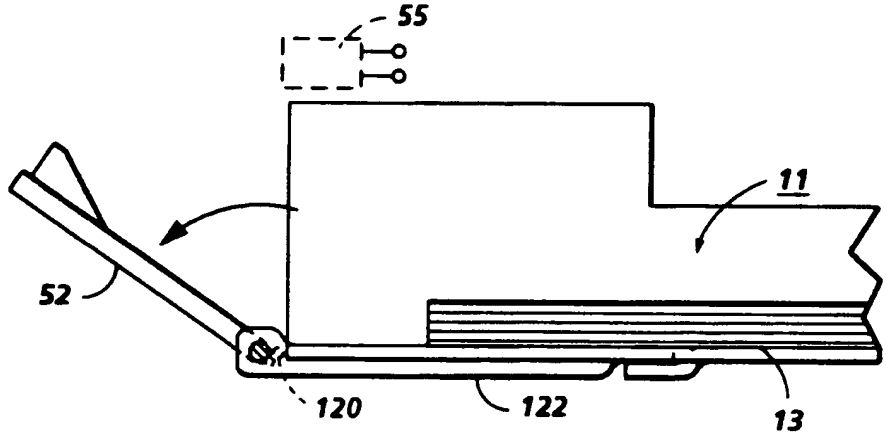
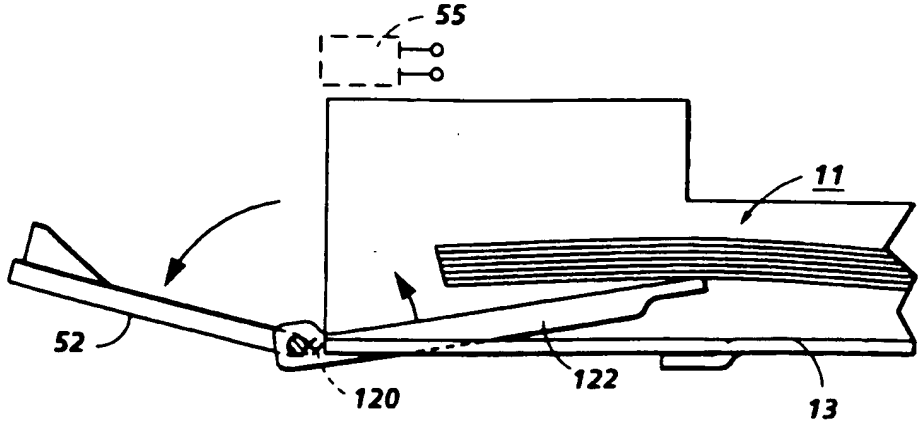


FIG. 11C



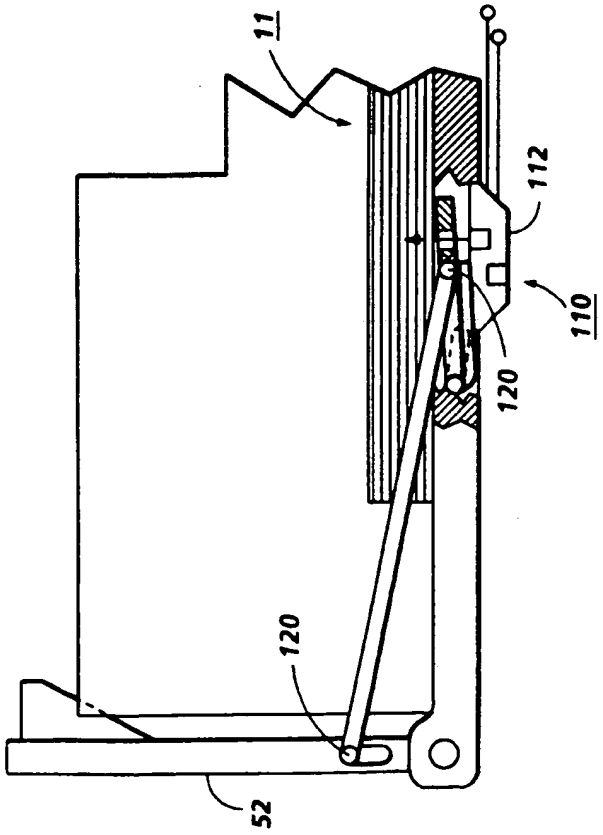


FIG. 12A

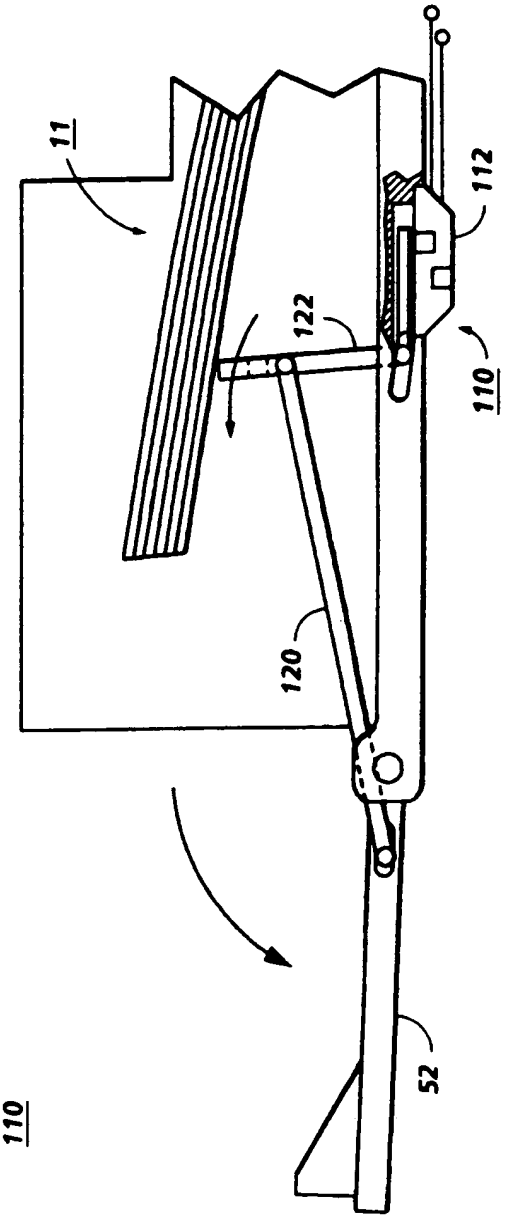


FIG. 12B

FIG. 13A

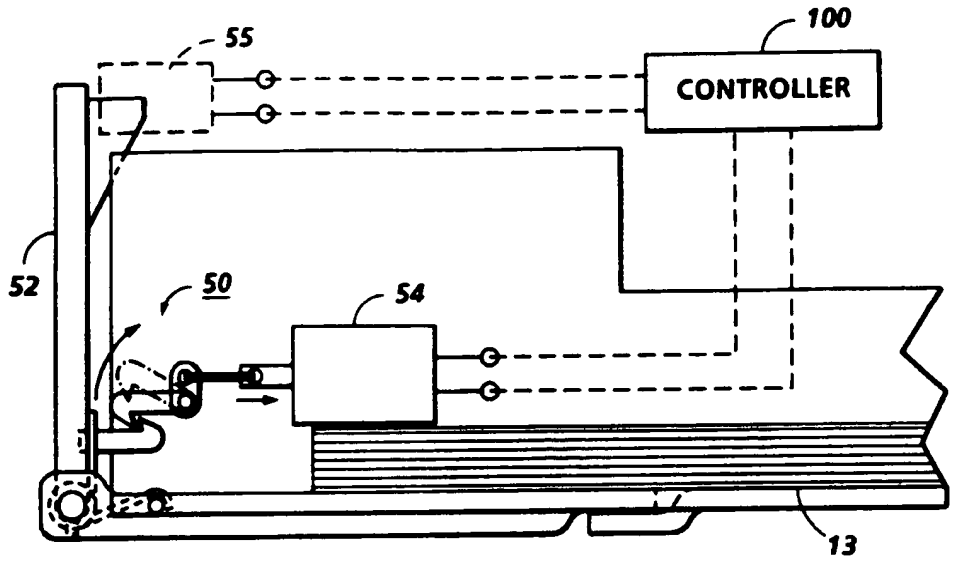
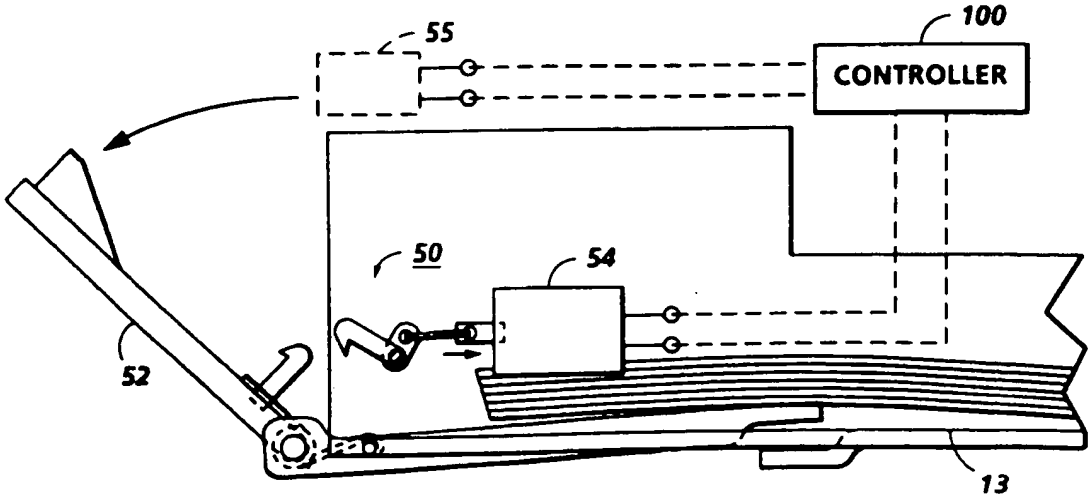


FIG. 13B



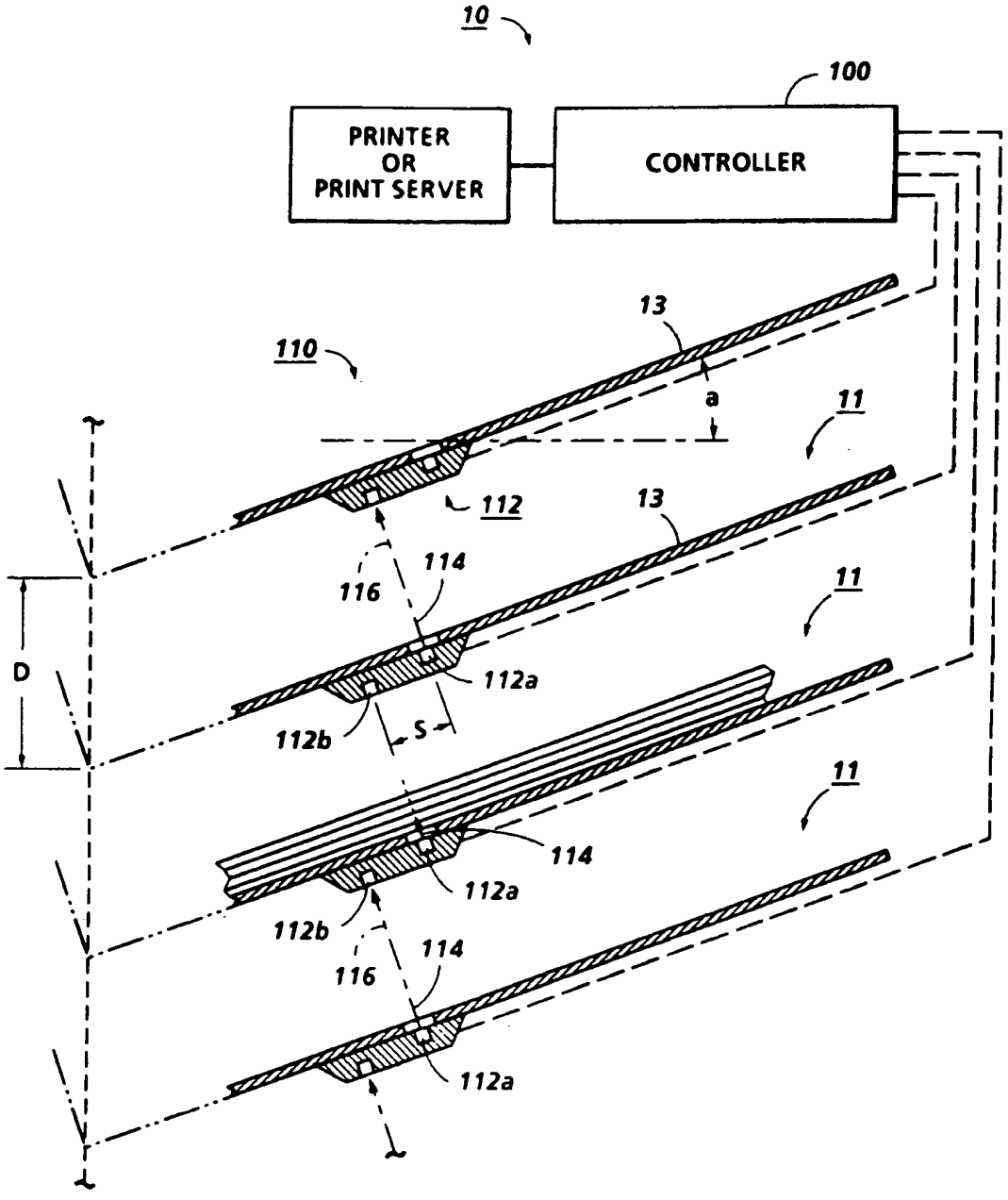
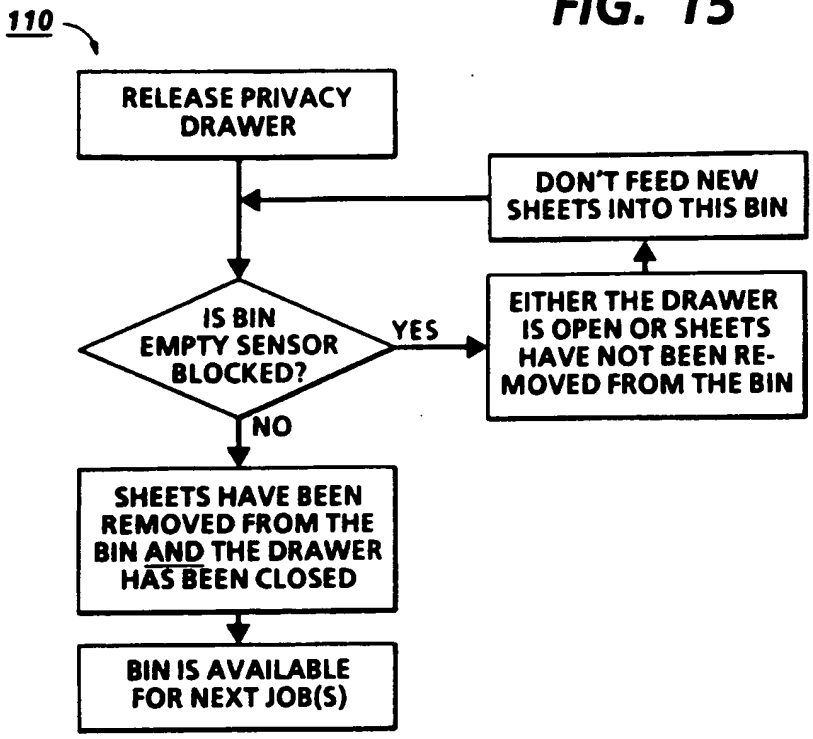

10
100
PRINTER OR PRINT SERVER
CONTROLLER
110
13
a
11
112
13
116
114
11
D
112a
112b
S
11
114
112a
112b
114
116
112a

FIG. 14

FIG. 15


110
RELEASE PRIVACY DRAWER
DON'T FEED NEW SHEETS INTO THIS BIN
IS BIN EMPTY SENSOR BLOCKED?
YES
EITHER THE DRAWER IS OPEN OR SHEETS HAVE NOT BEEN REMOVED FROM THE BIN
NO
SHEETS HAVE BEEN REMOVED FROM THE BIN AND THE DRAWER HAS BEEN CLOSED
BIN IS AVAILABLE FOR NEXT JOB(S)

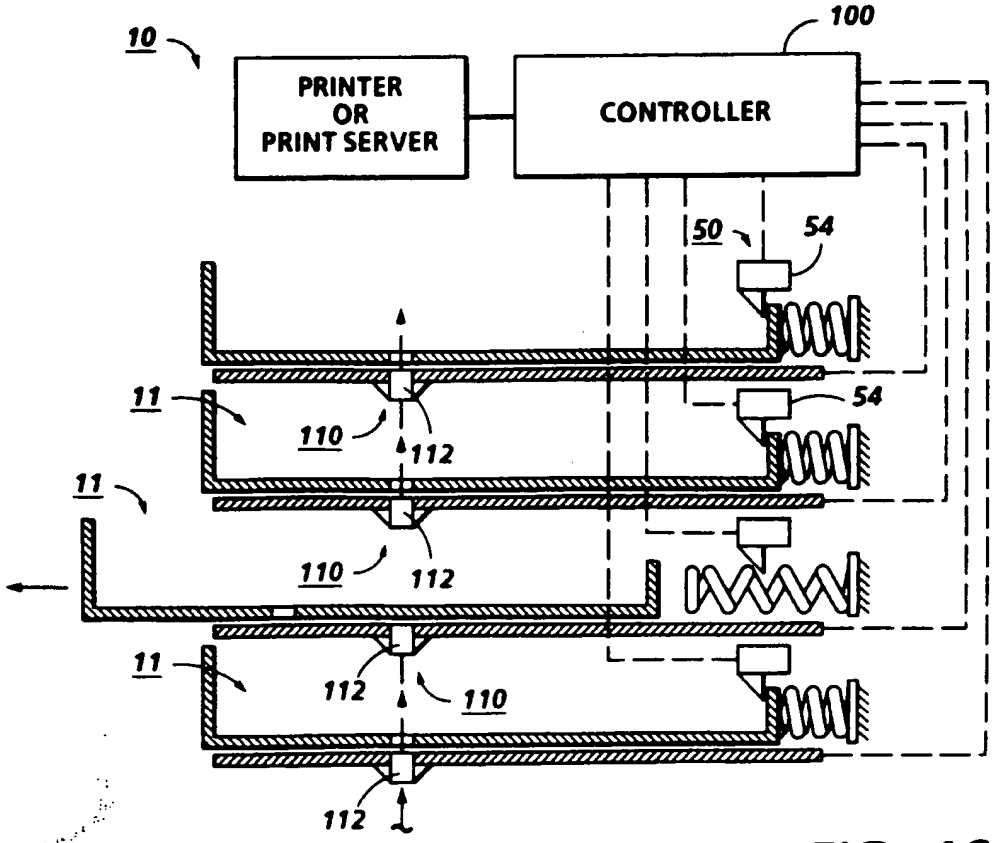

10
100
PRINTER OR PRINT SERVER
CONTROLLER
50
54
11
110
112

FIG. 16

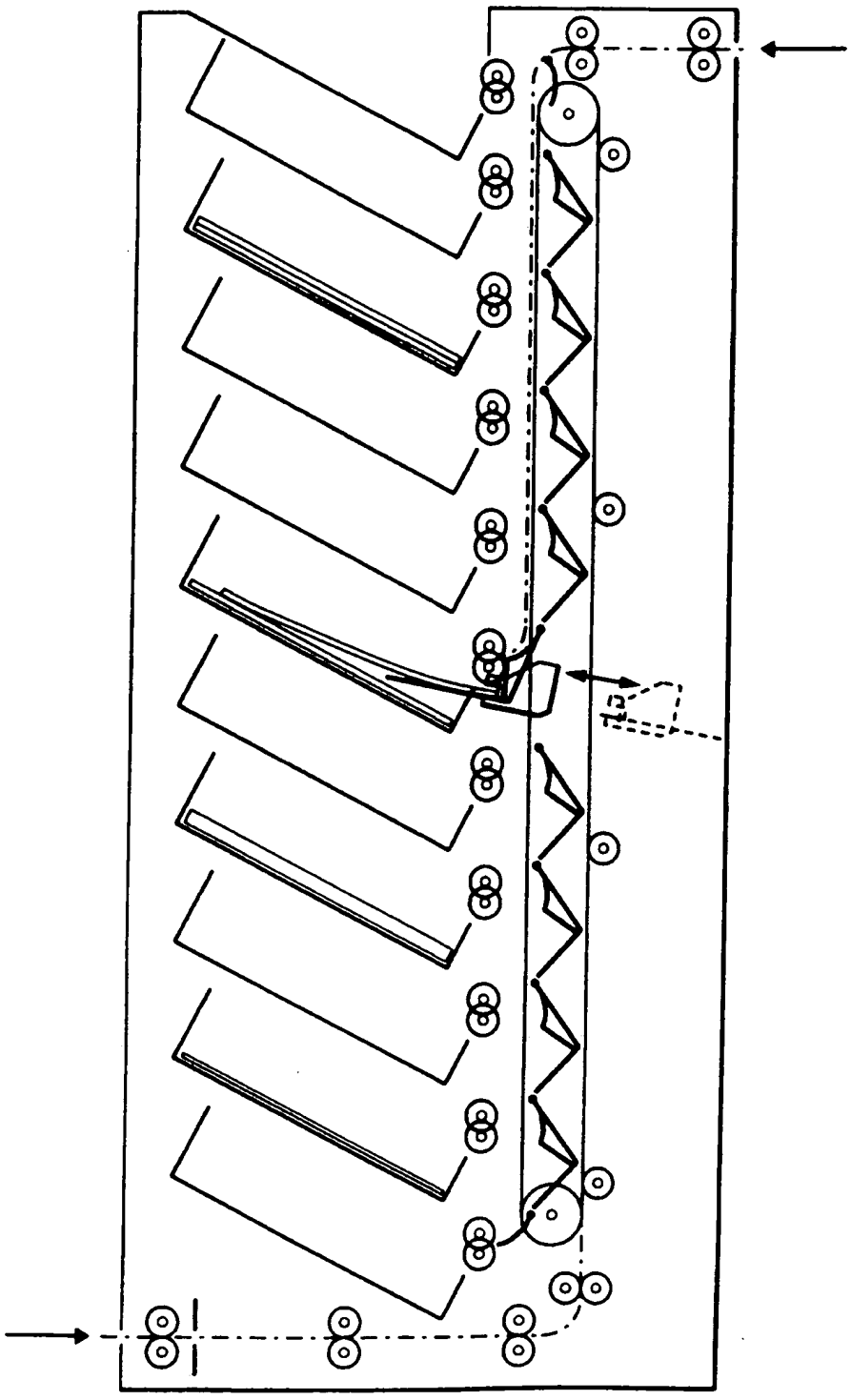


FIG. 17

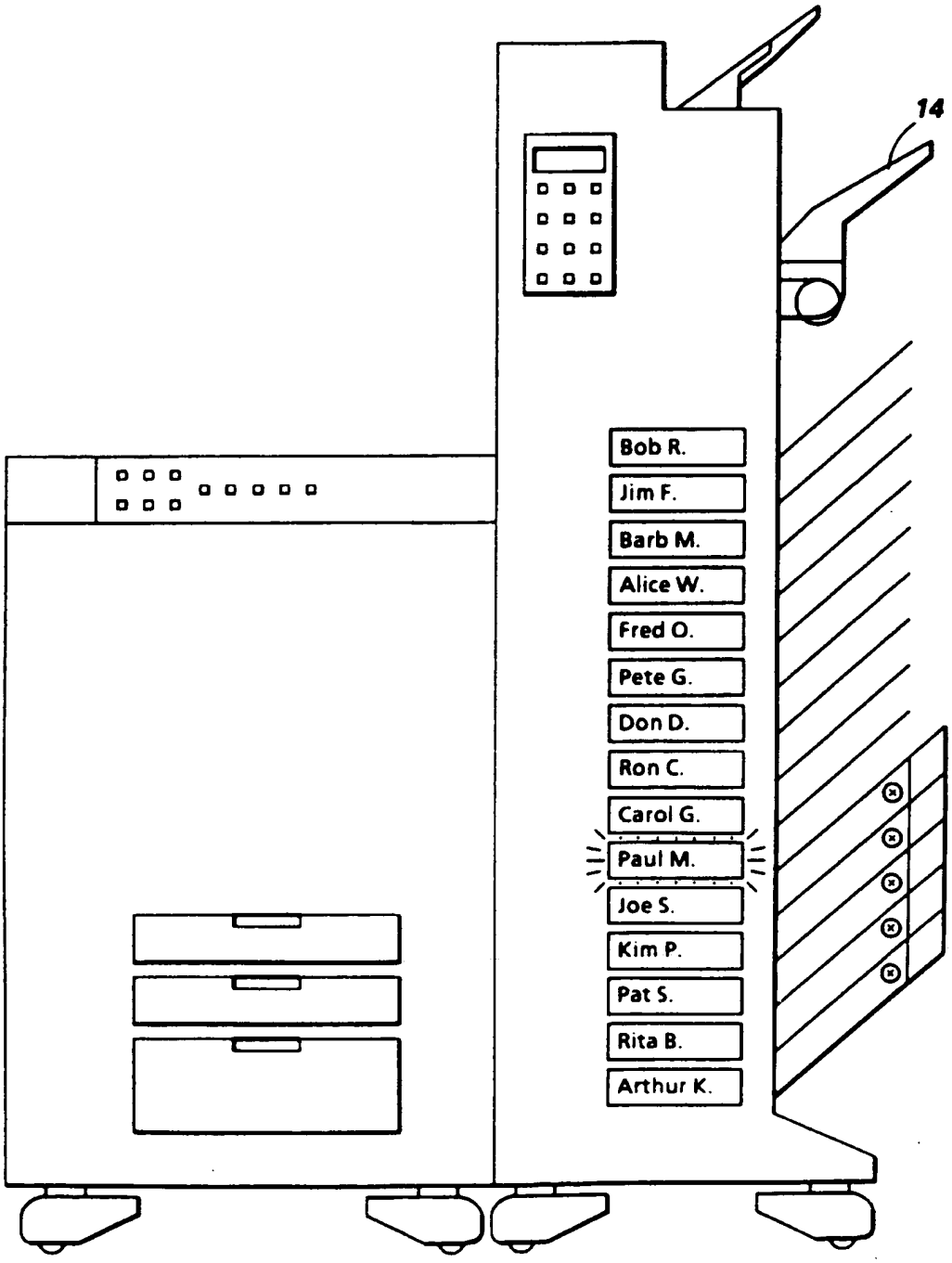

14
Bob R.
Jim F.
Barb M.
Alice W.
Fred O.
Pete G.
Don D.
Ron C.
Carol G.
Paul M.
Joe S.
Kim P.
Pat S.
Rita B.
Arthur K.

FIG. 18

FIG. 19

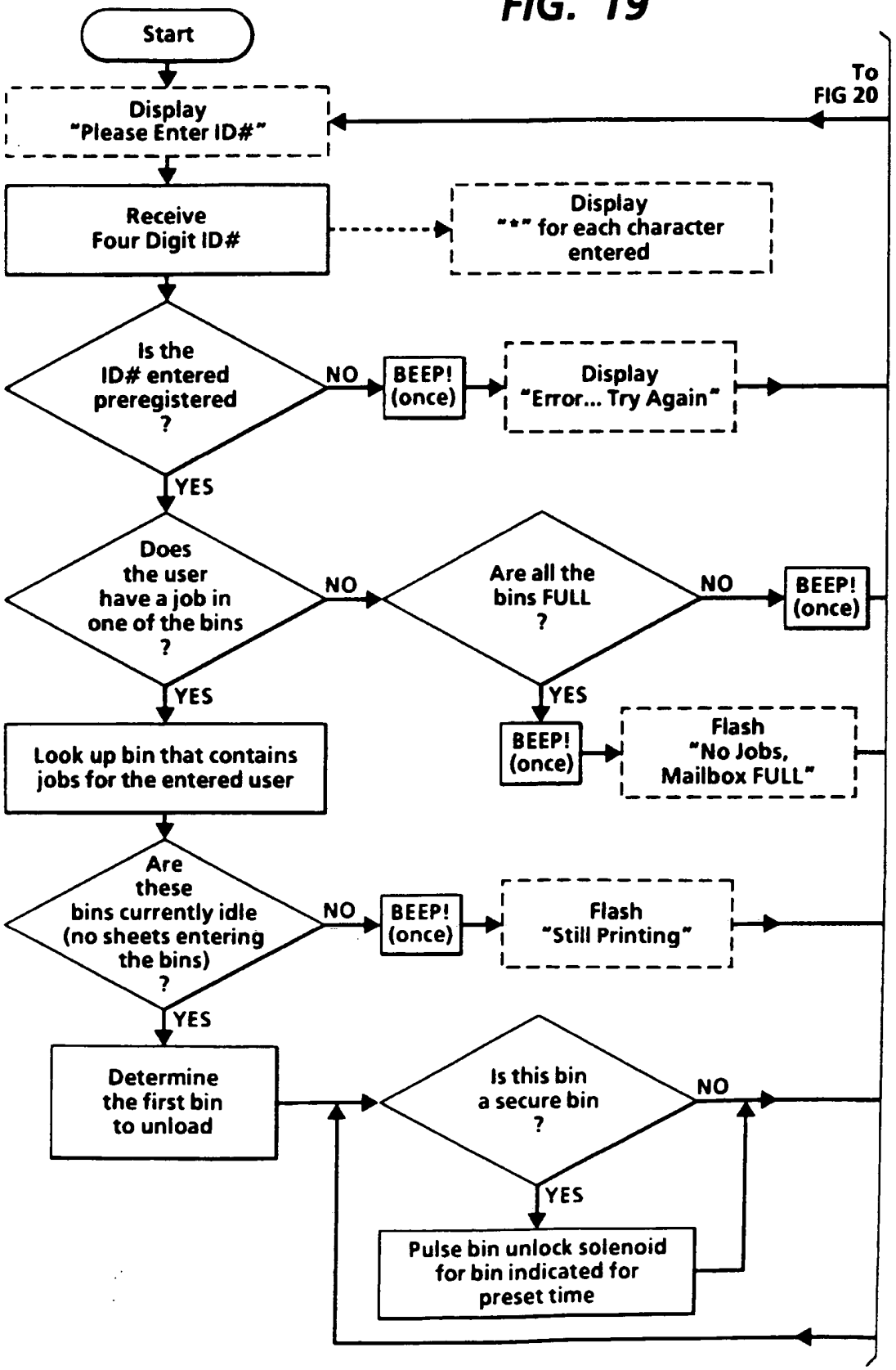

Start
Display "Please Enter ID#"
To FIG 20
Receive Four Digit ID#
Display "*" for each character entered
Is the ID# entered preregistered ?
NO
BEEP! (once)
Display "Error... Try Again"
YES
Does the user have a job in one of the bins ?
NO
Are all the bins FULL ?
NO
BEEP! (once)
YES
YES
Look up bin that contains jobs for the entered user
BEEP! (once)
Flash "No Jobs, Mailbox FULL"
Are these bins currently idle (no sheets entering the bins) ?
NO
BEEP! (once)
Flash "Still Printing"
YES
Determine the first bin to unload
Is this bin a secure bin ?
NO
YES
Pulse bin unlock solenoid for bin indicated for preset time

FIG. 20

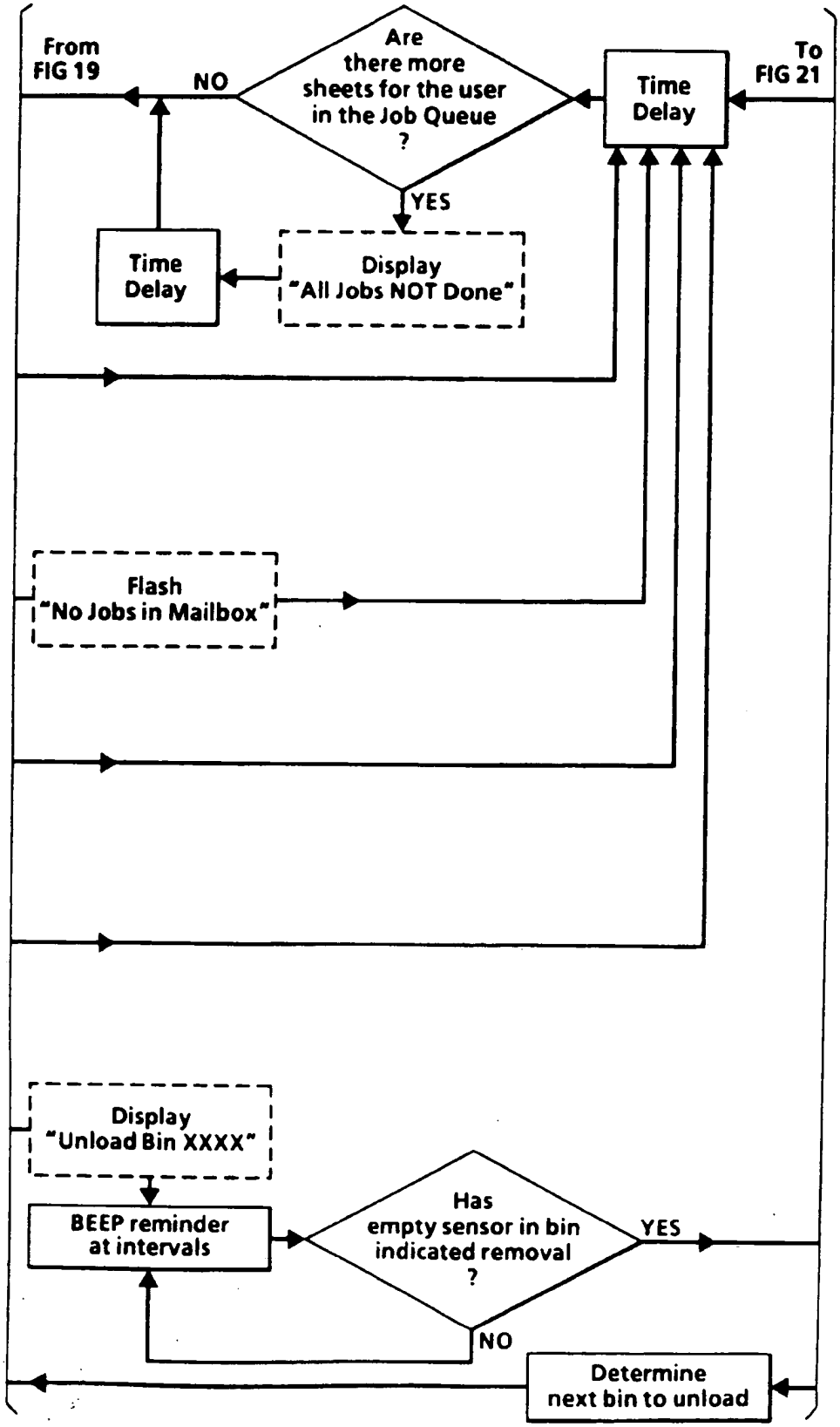
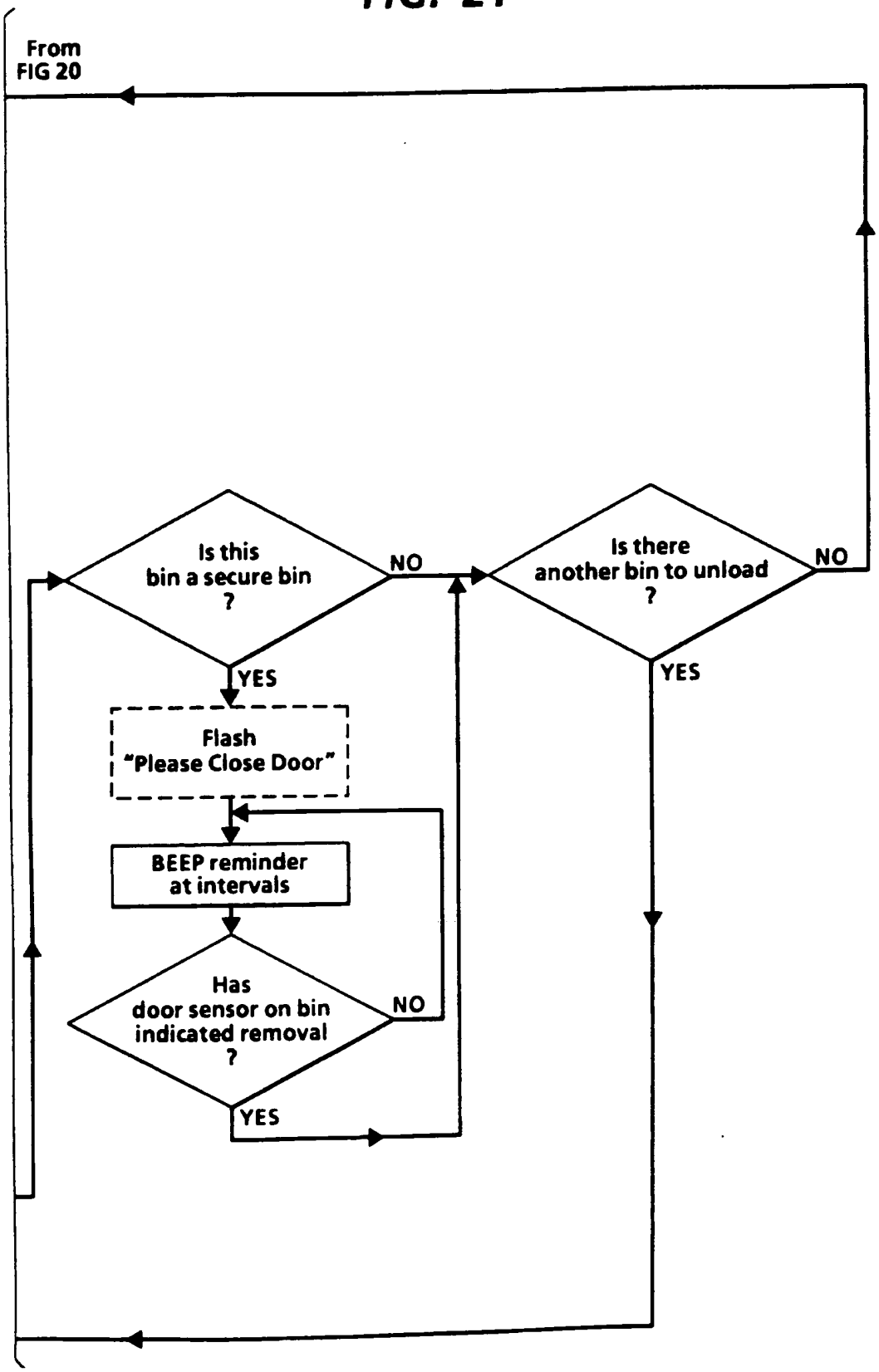

From FIG 19
NO
Are there more sheets for the user in the Job Queue ?
YES
Time Delay
To FIG 21
Time Delay
Display "All Jobs NOT Done"
Flash "No Jobs in Mailbox"
Display "Unload Bin XXXX"
BEEP reminder at intervals
Has empty sensor in bin indicated removal ?
YES
NO
Determine next bin to unload

FIG. 21


From FIG 20
Is this bin a secure bin ?
NO
Is there another bin to unload ?
NO
YES
YES
Flash "Please Close Door"
BEEP reminder at intervals
Has door sensor on bin indicated removal ?
NO
YES

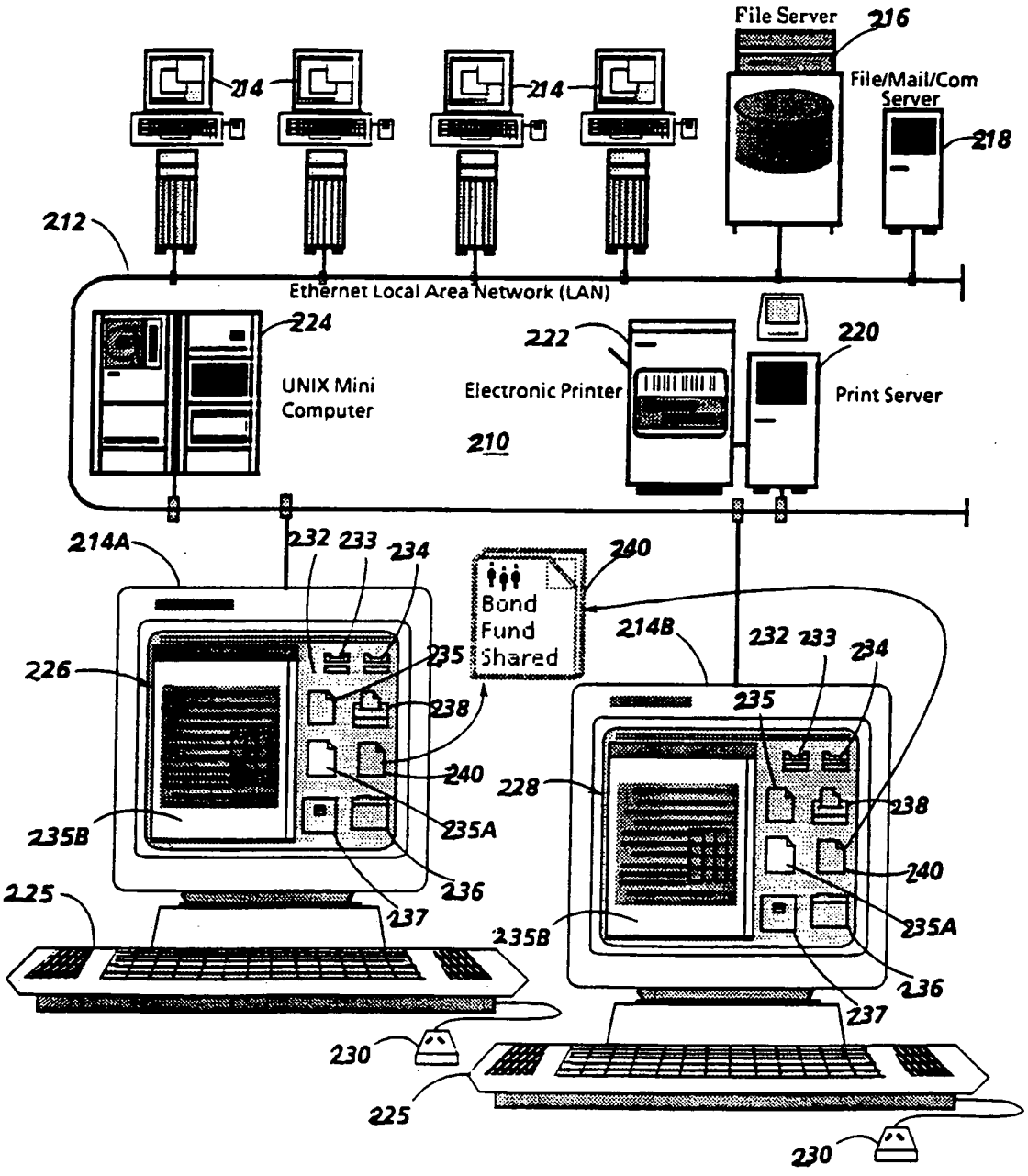


FIG. 22
PRIOR ART

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 94 30 3031

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.5)
P,X	EP-A-0 585 075 (XEROX CORPORATION) * the whole document *	1-16	G03G15/00
Y	PATENT ABSTRACTS OF JAPAN vol. 14, no. 347 (M-1002) 26 July 1990 & JP-A-02 120 068 (FUJI XEROX CO. LTD.) * abstract *	1,2,7	
Y	PATENT ABSTRACTS OF JAPAN vol. 14, no. 384 (M-1013) 20 August 1990 & JP-A-02 144 372 (CANON INC.) * abstract *	1,2,7	
A	PATENT ABSTRACTS OF JAPAN vol. 10, no. 261 (M-514) 5 June 1986 & JP-A-61 086 365 (RICOH CO. LTD.) * abstract *	3	
A	US-A-4 935 771 (MINOLTA CAMERA K.K.) * column 5, line 23 - column 6, line 15 *	1-5	
D,A	US-A-4 522 486 (IBM CORPORATION) * abstract *	3	TECHNICAL FIELDS SEARCHED (Int.Cl.5) G03G
D,A	EP-A-0 241 273 (XEROX CORPORATION) * column 6, line 59 - column 7, line 44; figures *	6-8,11	
A	PATENT ABSTRACTS OF JAPAN vol. 9, no. 280 (E-356) 8 November 1985 & JP-A-60 123 155 (CANON K.K.) * abstract *		
A	PATENT ABSTRACTS OF JAPAN vol. 13, no. 392 (M-865) 30 August 1989 & JP-A-01 139 468 (RICOH CO. LTD.) * abstract *		

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	2 August 1994	Thibaut, E

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

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